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TO: Mary Blakeslee
FROM: Tom Hagler
4 pages

November 11, 1994

The Honorable Elizabeth Rieke
Assistant Secretary for Water and Science
United States Department of the Interior
1849 C Street N.W., MS-6640
Washington D.C. 20240

Subject: Joint Water Users Proposal on Bay-Delta Standards

Dear Secretary Rieke:

As a result of your meeting on October 14, 1994 with representatives of the Joint Water Users on their proposal for a comprehensive set of Bay-Delta Standards, I was designated to convene a meeting of the technical staff of Federal and State agencies, environmental organizations and the Joint Water Users for the purpose of documenting the areas in which there were technical disagreements with the proposal. The meeting was held on October 18, 1994. In attendance were staff from the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, the U.S. Bureau of Reclamation, the California Department of Fish and Game, the California Department of Water Resources, the Natural Heritage Institute, the Bay Institute and Joint Water Users, which includes the California Urban Water Agencies, the Kern County Water Agency, the San Luis-Delta Mendota Water Authority and the Tulare Lake Basin Water Storage District. Subsequent to the meeting, I wrote a synopsis which was reviewed by all parties; from that synopsis as well as submissions by the technical staff, I prepared a joint report. I am pleased to transmit to you that report.

While the Bay-Delta proposal under consideration is comprehensive and deals with a wide range of elements, the areas of disagreement were narrowed down to five, of which two are considered the most significant: the measures for San Joaquin salmon and the water export restrictions. One area, that concerning warm water spawning habitat, appears to me to be more of a policy issue than a technical issue. In the other areas, I believe it is fair to say that, while there are disagreements, the differences are not large.

One very positive outcome of the meeting and subsequent discussions was that the comments were carefully considered and the Joint Water Users draft proposal was modified as a result; the most significant modification was to incorporate protections

for spring-run salmon. The Technical Committee of the Joint Water Users is continuing to evaluate the comments and continues to be encouraged by the Policy Committee to recommend appropriate changes.

The report consists of a concise description of each issue followed by two sections: one presenting the point of view of the Joint Water Users Technical Committee and the other the point of view of the Club FED technical staff. Attachment 1 to the report is information that was requested at the meeting and was submitted by the Water Users Group to the parties. Attachment 2 is supporting material submitted by the Club FED technical staff, and Attachment 3 is the synopsis of the October 18 meeting.

I look forward to continuing the dialogue on this proposal and the issues related to the Bay-Delta estuary. If you have any questions or require clarification on any matter in the report, please contact me at (510) 674-8057.

Sincerely,

Gregory Gartrell, PhD, PE
Principal Engineer

GG/ce

Enclosure

cc: Roger Patterson
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Andy Moran

bcc:
Patrick Wright, Bruce Herbold (EPA)
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Gary Stern (NMFS)
Perry Herrgesell, Don Stevens, Terry Mills (DFG)
John Burke, Michael Jackson (USGS)
Tom Howard, Jerry Johns (SWRCB)
Dave Kennedy, George Barnes, Ed Winkler, Randy Brown (DWR)
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Lena Tam (EBMUD)
Roger James, Walt Wadlow (SCVWD)
Dan Steiner, Kevin Haroff (City of San Francisco)
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Steve Macaulay (SWC)
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Tom Clark, Dave Schuster (KCWA)
Tom Hurlbutt (Tulare)
Chuck Hanson, Paul Bratovich (KCWA)
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Mike Heaton (Westlands)
Richard Golb (NCWA)
CUWA Managers

COMMENTS: _____

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Report on Discussions with Federal and State Agencies and Interested Groups
Summary of Areas of Technical Disagreement
on the
Joint Ag/Urban Draft Proposal
for Bay-Delta Standards

November 10, 1994

Introduction

The purpose of this report is to document the areas in which there are technical disagreements concerning the Joint Water Users (Ag/Urban) draft proposal for comprehensive Bay-Delta standards. The Joint Water Users proposing these standards include the member agencies of the California Urban Water Agencies, the San Luis-Delta Mendota Water Authority, the Kern County Water Agency and the Tulare Lake Basin Water Storage District. Comments on the draft proposal were received from technical experts from the U.S. Bureau of Reclamation, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the U.S. Environmental Protection Agency, the California Department of Fish and Game and a number of environmental organizations, including the Natural Heritage Institute and the Bay Institute.

This report documents the key areas of technical disagreement with the proposal raised by Federal agencies and others. It should be noted that all the proposals now being considered cover a wide range of topics and options throughout the year; the areas of technical disagreement have been narrowed down to the two most significant areas (San Joaquin River measures in the spring and export limits) and several others in which the proposals are more closely aligned.

The identification of the areas of technical disagreement was the result of a formal meeting on October 18, 1994 that included technical representatives of the Joint Water Users, State and Federal Agencies, and other interested parties. Attachment 3 is a synopsis of that meeting.

In the discussion that follows, each key issue is defined and the areas of technical disagreement are summarized. The summary is then followed by a brief description of the technical basis for the draft proposal (contributed by the Ag/Urban group) and the technical basis for the disagreement (contributed by the Club FED representatives and others). Attachment 1 contains supporting documentation for the technical basis for the draft proposal, while Attachment 2 contains supporting documentation for the areas in which disagreements were identified.

Summary

Five areas of technical disagreement have been identified; of these, two have been identified as the most significant (San Joaquin River measures directed toward the protection of salmon and export limits). One area (differences in the application of the western Delta habitat protection, or "X2", standards) was identified as an area where the disagreements may not be significant because the proposals are so close. Other areas of disagreement include proposals for cross-channel closures (where the differences are limited) and measures to protect striped bass and warm water spawning habitat, which appear to be more policy than technical disagreements. In addition, several areas were identified on which there was general agreement that the Ag/Urban proposal needs clarification. The material below summarizes the disagreements and

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provides brief statements regarding the technical background behind the disagreements. As a result of the discussions at the meeting, the Ag/Urban draft proposal was modified; the most significant modification was the incorporation of measures to protect spring-run salmon.

Discussion

1. San Joaquin River: Spring measures for salmon outmigration

Issue

The issue involves the appropriate level of protection directed in large part for outmigrating salmon in the spring. The Ag/Urban draft proposal provides for a thirty (30) day period (the beginning of which is normally April 15, but can be flexible based on monitoring) with required flow levels into the Delta from the San Joaquin River, concurrent export limitations to no more than the San Joaquin River inflow and a concurrent closure of the head of Old River to prevent outmigrating salmon from being diverted directly towards the export pumps.

Summary of the disagreement

The major disagreement, characterized as significant, was identified as the level of protection for San Joaquin fall run smolts in the Ag/Urban proposal. It was pointed out that the level of flows proposed by the Ag/Urban group (2000 cubic feet per second to 5000 cfs) during the one month period are less than those to meet the smolt survival goals in the Club FED alternative (4000 cfs to 10,000 cfs), and that the export limits in the Ag/Urban proposal (although agreed to as an improvement over historical conditions) are higher than the Club FED alternative. It was further pointed out that the combination of lower flows and higher exports would likely produce lower benefits than the Club FED alternative.

Both the Ag/Urban and Club FED proposals provide for the use of the Old River barrier, which will increase the protection of San Joaquin fall run smolts at any given flow and export level. However, it was suggested that its use may have negative impacts on Delta smelt and winter run salmon. The Club FED proposal limits exports to minimal levels (1500 cfs) in order to minimize any potential negative impacts during its one month installation and to give smolts the best possible chance of surviving their passage during the limited pulse flow period.

Another difference that arose concerned the Club FED smolt survival goals and their relationship to the CVPIA fish doubling requirements; while it was indicated that the proposal was consistent with these CVPIA goals, the goals themselves are designed independently of the CVPIA, to protect the fish migration beneficial use in the Bay/Delta Estuary. The Ag/Urban group does not consider the CVPIA fish doubling goals as part of the Bay-Delta standards, although it believes their proposal is not inconsistent with them. The fact that the Ag/Urban proposal does not include numerical goals was also an issue.

Technical basis for the Ag/Urban Draft Proposal (submitted by the Ag/Urban group)

The CVPIA fish doubling goal is a separate issue from the Bay-Delta standards; the Ag/Urban proposal is not inconsistent with those goals, but the Ag/Urban group does not consider them to be part of the Bay-Delta proceedings. Furthermore, the Ag/Urban proposal does not establish specific numerical goals for smolt survival as a standard, or as a benchmark upon which to evaluate the effectiveness of the proposed measures. The effectiveness of the proposed measures

will become evident through the interpretation of several response indices such as escapement, smolt survival and harvest. It is inappropriate and unnecessary to identify a numerical goal for this single aspect (smolt survival) of the life cycle of San Joaquin River salmon absent the recognition of goals for every life stage aspect that affects salmon populations.

Studies are not conclusive for defining relationships on which to base solid technical recommendations of outflow for the San Joaquin River. The proposed standards and measures (minimum flow February 15 through May 31, 31-day flow regime around April 15 through May 15, Old River barrier installation, direct pumping limitations during the 31-day flow regime, and other pumping limitations and flow objectives included in comprehensive standards of the Joint Proposal) will provide improved conditions for San Joaquin River salmon smolt survival and salmon populations.

Although there are serious questions about validity of the revised smolt survival index model, and it is recognized only as a tool upon which to suggest alternative management strategies, it has been used to evaluate the anticipated improvement to historical conditions which would result from the proposed Ag/Urban measures. The historical conditions between 1965 and 1993 were used to evaluate the Ag/Urban proposal. Results indicate that historical conditions provided an average smolt survival index of 0.138 for all years. The Ag/Urban measures, including the Old River Barrier, would have improved historical conditions to an average index of 0.259. For dry and critical years, respectively, the estimated historical indices of 0.037 and 0.034 would have improved to 0.200 and 0.170. These calculated changes are considered significant and do not include incidental improvements that will additionally occur to smolt survival due to other measures contained in the comprehensive standards of the Ag/Urban proposal. Note that these numbers differ from those calculated by the Club FED group; this analysis used the historical conditions as the basis, whereas the Club FED calculations assumed the flows in the San Joaquin River would be those that are assumed in operations studies. Examination of the historical record shows considerable differences between historical flows and those assumed in the operations studies (which are based upon a large number of simplifying assumptions). The San Joaquin River flows in the operations model are not valid for an analysis of this sort without taking into account those differences and simplifying assumptions.

The Ag/Urban proposal recommends linking the timing of Vernalis flows, barrier installation and pumping limitations to biological and hydrologic conditions within the San Joaquin River tributaries and the Delta. This type of planning and system management has been occurring during recent years. The Ag/Urban proposal recommends the continuation of such coordination efforts to most efficiently manage flows and operations within periods when biological improvements can be maximized. Although proposed for a specific period (April 15 - May 15), the standards should recognize flexibility in implementation to allow such efficient operations.

The events of 1994 related to Delta smelt "take" levels and the barrier installation have been examined. It was found that the "take" levels increased further when the barrier was removed. Preliminary model studies indicate that the barrier was not likely to be the cause of the increase.

Technical basis for the disagreement (submitted by the Club FED group)
San Joaquin salmon populations are at critically low levels and may currently warrant protection under the ESA. Various analyses have shown that adult escapement is significantly correlated to the export and flow conditions during the smolt outmigration 2½ years earlier. This confirms the hypothesis that conditions in the Delta are critical to the maintenance and restoration of the run. Measures to significantly improve the survival of San Joaquin smolts through the Delta are essential. A survival goal as an integral part of the Club FED plan. Club FED believes such a goal is necessary to ensure protective measures are performing as expected. Club FED has incorporated a smolt survival goal because it is directly linked to the lifestage targeted to benefit from the proposed actions. Other measures of improvement (harvest and escapement) are desired but factors outside of Delta operations could obscure relationships and adult measures will not be available until two to four years after the smolt outmigration. The survival goal will also allow revision if new, better protection measures can be implemented in the future.

Although survival, as measured by the San Joaquin smolt survival model, is estimated to be greater than historic conditions in dry years with the Ag/Urban proposal, it does not increase the historical average of 0.17 (1965 to 1989) (see Table 1, Attachment 2). The low level of protection offered in the Ag/Urban proposal is inadequate, because it is not an improvement over historical conditions. This level of protection does not provide assurance that this run will not be listed through the ESA process in the near future (certainty issue). The Club FED proposal increases San Joaquin smolt survival to an average of 0.24 (1965-1989) as measured by the San Joaquin smolt survival model.

The difference between improvements in the proposals modeled by the Ag/Urban group and that done by the Club FED representatives are due to: 1) the Ag/Urban group used the historical base on which to superimpose the conditions of the two proposals. Club FED used the DWRSIM 1995 level of development operation study with 6.0 million acre feet of demand, because it is more representative of how the projects will operate in the future than the historical base. 2) the Ag/Urban group limited exports to 6000 cfs in April and May; exports are often likely to exceed this level with the Ag/Urban proposal. 3) Ag/Urban estimated 80% of smolts in the San Joaquin basin would be protected during the one month change in operations. Estimates during recent dry and critical years indicate approximately 64% of outmigrants pass Mossdale in the 28 days centered on May 1 (WRINT-DFG-25). Table 1 in Attachment 2 reflects the benefits expected with 64% of the smolt outmigration passing during the one month barrier installation. 4) Due to the fact that the model is estimating the benefits of a barrier, using data obtained without the barrier, benefits are overestimated in both proposals due to the inability of the model to accurately reflect the increased reverse flows at Lower Old an Middle River at any one export level when the barrier is in place.

Delta smelt "take" levels increased following the installation of the Old River barrier in 1994 due to increased reverse flows in lower Old and Middle rivers (central Delta). To minimize risks to Delta smelt and winter-run, and to provide the best possible conditions for San Joaquin smolts during the limited pulse flow period, exports levels should be reduced to minimal levels when the barrier is in place.

The best available information indicates that San Joaquin flows, export restrictions, and an upper Old River barrier are the best measures to protect San Joaquin salmon outmigrants. As these measures are implemented, modifications may be necessary or new methods may become available. Survival goals will allow the kind of flexibility to insure that substitutes can be made without compromising the level of protection.

Evidence indicates that the peak of San Joaquin salmon smolt emigration into the Delta is between mid-April and mid-May. The success of basing the 30-day period on real time monitoring is uncertain and untested, and the USFWS does not believe that it will work with the low number of smolts currently migrating down the San Joaquin. However if real-time monitoring is thoroughly tested before use, and proves to be accurate and useful in meeting survival goals, the it can and should be incorporated into the implementation plan in the future.

The Fish and Wildlife Service staff believe the San Joaquin flows also contribute to providing suitable habitat for Delta smelt and can help offset potential effects of the Delta cross-channel closure for smelt and splittail. They have provided for a San Joaquin contribution to meeting the X2 requirements (see discussion below) and have expressed the concern that the Ag/Urban proposal allows pumping levels during the pulse flow period that would allow the biological benefits to be lost.

2. Export Limits

Issue

The Ag/Urban draft proposal provides for exports to be limited to a percentage of inflow to the Delta. The proposed percentages vary with time of the year. They provide for modest relaxations in some months provided that no adverse impacts on native species can be demonstrated. The disagreements focus on the level of protection provided in some months, particularly February, and the trigger for relaxation to the higher percentage. The areas of disagreement are divided below into three time periods: February, March through June, and July through January.

2.1 February Limits

Issue

The Ag/Urban draft proposal provides for exports of no more than 65% of Delta inflow. There is disagreement whether this provides sufficient protection overall.

Summary of the disagreement

Raised as concerns are the high rate of export pumping that would be allowed in the presence of a large portion of the juvenile winter-run chinook population. Since the Cross Channel is proposed for closure in February, the frequency and magnitude of net reverse flow conditions in the lower San Joaquin River (as measured by "QWEST", an index for the flow, Q, in the western Delta) would increase over historic conditions with the Ag/Urban export limit. Significantly higher export rates would occur in drier years than allowed under the existing NMFS biological opinion for winter-run chinook salmon. "Take" of juvenile winter-run chinook at the Delta fish facilities may increase. The importance of the QWEST index to salmon smolt survival has been questioned by the Ag/Urban representatives.

Technical basis for the Ag/Urban Draft Proposal (submitted by the Ag/Urban group)
There are two common points that are addressed in this section. These are: A) the overall basis for the Ag/Urban proposal on export limits, and B) the use of the QWEST index to limit exports. These are addressed only in this subsection. The discussions related to each time period are addressed in all the subsections.

A) Overall Basis for the Export Limits of the Ag/Urban Proposal
The biological objective of the limits is to reduce fish, egg, and larvae entrainment and mortality at the pumps through export restrictions and intensive real-time monitoring/response designed to detect presence of fish in areas adjacent to the pumps. Development of the export/inflow concept was founded on two basic principals which include (1) exports should decrease when fresh water inflow to the Delta is reduced and a larger percentage of fish and other aquatic organisms are distributed further upstream where they are more susceptible to export losses, and (2) the percentage of water diverted in recent years, particularly during the spring, has increased substantially above levels (expressed as a ratio of exports to inflow) during earlier years when aquatic resources inhabiting the Bay-Delta system were at more acceptable levels.

State Water Project fish salvage records were used to evaluate the seasonal distribution in susceptibility and loss resulting from water project operations. Review of salvage data shows that the losses for striped bass, chinook salmon, American shad, Sacramento splittail, longfin smelt, and delta smelt were greatest in April (10%), May (23%), June (24%), and July (16%). Over 70% of the combined average losses for these species occurred between April and July. Average monthly losses ranged from 2 to 6 percent between August and March. In addition to salvage losses relatively large numbers of fish eggs and larvae, which are not accounted for in salvage data, are susceptible to entrainment losses during the spring (April-June). Thus, relatively low export/inflow ratios were specified during the spring when fish are especially vulnerable to entrainment at the pumps, with a general increase in allowable exports during other times when fish are less vulnerable to diversion losses.

The Ag/Urban export limits should not be examined simply by themselves, since the proposal is designed as a comprehensive package that takes an ecosystem approach to the Bay-Delta and does not address the problem in a species-by-species approach. In addition to the export limits, minimum flows are proposed throughout the year. The combination of the proposed flows and export limits provides significant improvement in overall habitat conditions in the Delta.

B) Use of QWEST to Limit Exports
The "QWEST" index has been historically used to estimate the "net reverse flow" in the lower San Joaquin River. QWEST is not measured, but calculated based on Delta inflows and exports. Attempts to correlate QWEST with biological factors, such as salmon smolt survival, result in poor correlations of questionable significance. It is implicitly assumed that tidal factors play no part in the relationship, an incorrect assumption because tidal flows are 100 times larger than QWEST levels. The real net flows in the Delta are up to ten times larger than the QWEST index, so actual Delta flows are not described by the index. The fundamental assumption that the QWEST index is significantly related to transport has been called into serious question and is not supported by field data; there is abundant evidence that contradicts the assumption.

The use of export/inflow ratios to limit exports has been questioned. Interestingly, the use of the QWEST index to limit exports is mathematically no different than the use of an export/inflow ratio as in the Ag/Urban proposal. The Ag/Urban proposal states that exports must not exceed a given fraction of the total inflow to the Delta (total inflow is the sum of the inflows from the Sacramento River, San Joaquin River and miscellaneous streams); the QWEST export limit proposed by Club FED states that exports must not exceed a fraction of the Sacramento River inflow (the fraction is about 30% when the Delta cross-channel is open, 13% when the cross-channel is closed), plus 100% of the inflow from the San Joaquin River and miscellaneous streams, plus (or minus) a given flow level. (Note that the fraction of the Sacramento River water that is allowed to be diverted in the Club FED proposal is anomalous: when the cross-channel is open, and survival of smolts is reduced, more pumping is allowed; when it is closed, and survival is increased, less pumping is allowed. Furthermore, use of QWEST allows all of the San Joaquin River inflow to be diverted.)

Both methods in fact use an export/inflow ratio; the difference is that the Ag/Urban group proposes the ratio be based upon the biological activity over the year, whereas the Club FED proposal uses fixed ratios (with adjustment for the cross-channel as noted above) and adjusts the given flow level (e.g., QWEST at 2000, 0 or -2000) over the year. It is not surprising that in many instances the final results are quite similar.

In response to the concern that the proposed levels are higher than historical averages, it is noted that the proposed requirements are for the maximum allowable levels, not the average levels, and comparison with average levels is technically inappropriate. Precisely the same argument could be made against the proposed QWEST levels (for example, since 1968, the proposed level for February has been exceeded only three times, and the average level for February is over 12,000 cfs). It is not a question of average levels, but of the maximum levels. In response to the concern on the comparison of historical levels and operations studies, the Ag/Urban group disagrees. Comparison of historical levels to operations studies is an apple-to-oranges comparison, and is invalid. The comparisons shown, which were requested at the meeting by Club FED, correctly compare historical conditions to what those conditions would have been like with the proposal, and separately compare operations studies with and without the proposals.

C) Specifics with Respect to February

The Ag/Urban approach for the proposal is to develop a comprehensive ecosystem approach, that includes improved habitat (through X2 requirements and minimum flow levels) and export limits that shift pumping away from the months of greatest vulnerability to losses at the export pumps to months of lesser vulnerability, as explained above. Other measures, such as closure of the Delta cross-channel, address additional specific needs in February.

Examination of the modeling results show an overall decrease in pumping in drier years due to the proposed limits (Attachment 1, pages 23 & 27). The data also indicate that overall, the two proposals are not very dissimilar in the distribution of pumping levels, with the Ag/Urban proposal allowing higher pumping (by about 1000 cfs) at the same frequency. The Ag/Urban group is further evaluating these data to better understand the differences.

Technical basis for the disagreement (submitted by the Club FED group)
Review of Delta conditions during the period of 1955 to 1992 indicates that this level of export does not provide additional protection overall and provides significantly less protection than the current NMFS biological opinion for winter-run chinook salmon. Exports levels have only slightly exceeded 65% in February 2 of the past 38 years (67 and 72 percent) (see table 2, Attachment 2). The Ag/Urban proposal will allow high export rates and very negative levels of QWEST. With the Cross-Channel gates closed, QWEST will be negative more frequently, for a longer duration, and to greater negative levels than under historic conditions. These Central Delta hydrologic conditions, as measured by QWEST, will be adverse for both rearing and outmigrating salmon juveniles, particularly winter-run chinook salmon, and for delta smelt and other estuarine species. "Take" levels of winter-run chinook salmon are likely to increase significantly over the existing NMFS biological opinion due to higher exports and reduced QWEST. Mortality of Sacramento River spring-run smolts and fall-run chinook fry may also increase over current levels.

Export and QWEST have been found to be correlated to salmon smolt survival in the Central Delta and downstream of Ryde on the mainstem Sacramento River, respectively (Figures 1, 2, and 3, Attachment 2). Percentage of inflow has not shown any correlation. Fish and Wildlife Service staff believe the QWEST limits also provide substantial benefits to delta smelt and longfin smelt, including benefits to adult migration. They further believe that there is an over reliance on San Joaquin flows to provide exports in the Ag/Urban proposal.

Export/inflow levels do not assure downstream flow from the Central Delta and San Joaquin River to the ocean and can decrease QWEST levels over the historical period and that provided in the Biological Opinion. Although QWEST is only an index it appears to be the best parameter to monitor if net downstream flow from the San Joaquin River and Central Delta to the Western Delta is desired. Ideally, QWEST values should be positive all year round, but the Club FED package has prioritized them during the peak winter run outmigration period.

In Attachment 1, several tables and graphs are shown comparing historical export/inflow levels to proposed export/inflow levels to support the Ag/Urban statement that there is "an overall decrease in pumping in drier years due to the proposed limits". Club FED believes this is not the correct data to compare to evaluate the statement because the graphs comparing the new levels do not use the proper base for comparison. A DWRSIM operations model with the Ag/CUWA criteria incorporated should be used to compare to historical values. The DWRSIM model takes into consideration how the project will be operated in the future, given the new set of Delta protective criteria, and not the change in the export/inflow ration that would have been constraining for years in the past. Both proposals need to be compared to historical levels to compare the various elements and their potential improvement to recent historical levels.

Club FED desires to endorse an ecosystem approach to the Bay-Delta standards and believes actions to protect a multitude of species (longfin smelt, Delta smelt, striped bass, all races of chinook salmon, splittail, Cragnon, etc.) is the way to achieve such an objective. Ideally, goals would be established for each species within the ecosystem and success of improvements in Delta habitat conditions could be measured. Unfortunately, data is unavailable for many species, so

the needs of certain species were identified in the Club FED plan to serve as surrogates for the ecosystem as a whole.

The Ag/Urban group has proposed what they say is based on an ecosystem approach, but no goals are set, making it difficult to ensure adequate protection of either specific species or the ecosystem.

2.2 March - June Limits

Issue

The Ag/Urban proposal provides for exports of no more than 30% of Delta inflows during this period, with a relaxation to 35% if no significant impact to native species can be demonstrated. The triggering mechanism for the relaxation has not yet been defined.

Summary of the disagreement

This was characterized as potentially an area in which there may not be significant disagreement. Raised as concerns are the rate of export pumping that would be allowed in the presence of all races of Sacramento and San Joaquin juvenile chinook salmon and whether the Ag/Urban proposal provides for an increased level of protection over historic conditions. There were also questions about the goals and objectives of the Ag/Urban proposal and the significance of the export/inflow relationships with respect to smolt survival.

Technical basis for the Ag/Urban Draft Proposal (submitted by the Ag/Urban group)

As discussed under subsection 2.1, the goal of the Ag/Urban proposal is to develop a comprehensive approach to improvement of the Bay-Delta ecosystem, rather than a species-by-species approach. As discussed earlier, there is no fundamental mathematical difference between the use of export/inflow relationships and the use of QWEST to limit exports; there is only a difference in the particular ratios and constant levels picked. In many instances, the two methods give very similar results.

Examination of the historical data (Attachment 1, pages 23-24) shows that the Ag/Urban proposal provides for significant improvement in protection for all species in this period. Export ratios and absolute levels of exports are reduced over historical levels, especially in the critical dry periods. Delta outflow levels are increased, improving the Delta habitat. Operations studies also show significant overall improvement in habitat and protection for this period (Attachment 1, pages 28-29), especially in the March and April period that is critical for many species.

The use of higher export levels is intended to be triggered only if it can be shown that there are no adverse impacts to native species. The exact mechanism that might be used is still being developed.

Technical basis for the disagreement (submitted by the Club FED group)

The fisheries agencies want protection levels to be significantly improved over the recent historical period and the Ag/Urban proposal provides little improvement over historic conditions. There is no biological basis for selection of the export percentages. Higher rates of pumping during March and April would be allowed in drier years than under the existing NMFS biological opinion for winter-run chinook salmon and is likely to result in an increase level of

"take" in March and April. May and June export rates could be higher than D1485 conditions. With the closure of the Cross-Channel gates, the level of QWEST index would decrease over historic conditions, particularly in dry water years. With high in-Delta diversion rates during the spring months, total Delta withdrawals could be significantly higher than 30-35 percent. Higher losses of fall-run chinook salmon from the Sacramento and San Joaquin rivers as measured at the Delta fish salvage facilities may occur. The above arguments would also apply to estuarine fishes. The Service is concerned that the export/inflow relationships will not adequately protect estuarine fishes, including delta smelt, for the same reasons given above: that the QWEST levels provided for in the biological opinions could be exceeded. The QWEST limits also provide substantial benefits to delta smelt and longfin smelt.

The trigger mechanism for relaxation to a higher export percentage has not been defined. Thus, the trigger's ability to accurately detect no significant impact is unknown. The success of basing the export rates/protection actions on this trigger is unknown. The Service staff is concerned that using a negative finding as a trigger to allow relaxation may not be appropriate when species populations are very low and the probability of finding them are low. They believe it is premature to write such a requirement into a standard, especially Delta smelt.

2.3 July - January Limits

Issue

The Ag/Urban draft proposal provides for levels of exports varying from 35% to 65% of Delta inflow, depending on month. Months with levels below 65% provide for relaxations if it can be demonstrated that there is no significant impact to native species. The triggering mechanism for the relaxation needs to be defined.

Summary of the disagreement

The Ag/Urban draft proposal provides for export limits July through January; other proposals do not restrict the July through October period. There was concern that the rate of export pumping that would be allowed in November, December, and January is higher than historical levels and would occur in the presence of Sacramento River juvenile spring-run, late fall-run, and winter-run chinook salmon. Protection measures for Sacramento River spring-run chinook smolts and the early portion of the winter-run chinook outmigration were not been included in the Ag/Urban proposal.

Representatives from the California Department of Fish and Game disagreed with the proposed limits because they are higher than the historical averages and they do not believe that they are sufficiently protective of fisheries, including striped bass.

Technical basis for the Ag/Urban Draft Proposal (submitted by the Ag/Urban group)

As discussed under subsection 2.1, the goal of the Ag/Urban proposal is to develop a comprehensive approach to improvement of the Bay-Delta ecosystem, rather than a species-by-species approach. The proposal shifts exports from the spring and summer, the most critical period for many species in terms of migration, spawning and rearing, to the fall and winter. The Club FED proposal shifts the pumping from the spring into the early summer (Attachment 1, page 30), a period when historically there have been significant entrainment losses at the

export pumps and when juveniles are rearing in the Delta. The Ag/Urban group proposed to continue protection in this critical period, rather than removing all restrictions, in order to continue to maintain the improvements gained in the spring period. Consequently, both export restrictions and minimum flow levels are proposed, unlike the Club FED proposal which has neither.

Concern was expressed that the proposed levels would allow higher exports on a more frequent basis. Examination of the data from the operations studies (Attachment 1, pages 27, 31-32) shows this not to be the case. The two proposals show remarkably similar distributions of export levels in this period, and that they offer similar levels of protection in terms of exports. However, the Ag/Urban proposal includes minimum Delta outflows to ensure improved ecosystem habitat at the same time.

The Ag/Urban group has considered the comments concerning measures to protect spring-run chinook salmon and found them to be valid. The proposal has been modified to change the January closure of the Delta cross-channel to a closure of up to 30 days, based upon monitoring, from November through January.

Technical basis for the disagreement (submitted by the Club FED group)
Export limits proposed for November, December, and January would allow pumping rates to be higher in drier years than under the existing NMFS biological opinion for winter-run chinook salmon. Due to the proposed export restrictions during the spring months, pumping rates would frequently be higher than historic levels during October, November and December (see table 3, Attachment 2). The level of QWEST index would decrease in drier water years and significantly decrease in combination with the 30-days of Cross Channel gate closure. The fisheries agencies believe that Delta conditions during the fall and early winter period could become more adverse than historic conditions. Direct losses of Sacramento River spring-run, late fall-run, and winter-run chinook salmon juveniles as measured at the Delta fish salvage facilities may increase. Losses of delta smelt and longfin smelt at the pumps may also increase with the export/inflow relationships, for the same reasons given above.

The Ag/Urban representatives noted that the proposed requirements are for the maximum allowable levels, and comparison with average levels is technically inappropriate, but pumping constraints imposed during the spring time will require greater reliance on export pumping in the fall months and maximum export levels may frequently occur. The Ag/Urban proposal provides for significantly less protection for rearing and migrating salmon during November, December, and January than the existing NMFS biological opinion for winter-run chinook by allowing higher than historical levels of export and very negative QWEST conditions.

Sacramento River spring-run chinook are at critically low levels and may warrant protection under the ESA. The Ag/Urban proposal does include a Delta cross-channel closure for 30 days between November and January, but without QWEST constraints reverse flows could negate much of the benefit derived from closing the cross-channel gates.

3. X2 Sliding Scale

Issue

The Ag/Urban draft proposal provides for an X2 standard based on sliding scales derived from a mean of the 1968-1975 level of development, along with a modification in February that requires X2 at the confluence for the entire month, but relaxes the requirement at Chipps Island in dry years. In addition, it provides for X2 at the confluence in April, and minimum flows in May and June. The mechanism for the February relaxation is still being developed.

The major difference with the Club FED proposal is that the Club FED proposal provides for X2 to be located at the confluence for 150 days in all years. There is a minor difference with the sliding scales, which in the Club FED proposal were based upon the 1968 level of development. Practically speaking, the overall difference between the two proposals is small.

Summary of the disagreement

The disagreement was characterized as probably not significant because the two proposals appear to be very close. There was concern expressed that a flat requirement of 150 days at the confluence, with no relaxation for very dry years could result in detrimental effects on upstream reservoirs. There was also concern expressed that the Ag/Urban proposal did not provide for the 150 days and that it did not guarantee that the X2 position actually reach a given location, but there was disagreement over the significance of the latter item.

Technical basis for the Ag/Urban Draft Proposal (submitted by the Ag/Urban group)

Responding to comments at the meeting, the Ag/Urban group defined the February modification by changing the sliding scale for that month. The proposal now includes a requirement that the X2 standard be met at the confluence for the entire month of February in all years, and relaxes the Chipps Island requirement slightly in years with low runoff in January.

The proposal is based upon the use of the average of the 1968-1975 level of development. The figures in Attachment 1 (pages 7-8) show that in fact that, despite the concerns expressed about the level of development and the minimum flows, there is not very much practical difference between the proposals and that the biological benefits of the two proposals are indeed very similar.

Technical basis for the disagreement (submitted by the Club FED group)

In joint testimony to the State Water Resources Control Board EPA, NMFS and USFWS suggested that the late 1960's and early 1970's appeared to provide adequate habitat for estuarine species. The adequacy of this habitat appears to rest on two factors: a suitable level of development that existed up to or prior to this time and the level of unimpaired flow that occurred at that time.

The two-variable model relating unimpaired flow and level of development assumes that the level of development acts upon an average level of unimpaired flow. However, in the period from 1965 to 1975 there were no dry or critically dry years, so the impacts of level of development were attenuated by the relatively high levels of flow. The average 8-River Index for this period is roughly 20% greater than the rest of the period of record (1965-1975, average=27.845 MAF, 1906-1964 & 1976-1992, average=22.805 MAF). From this EPA concludes that the impacts

of the level of development in the 1968-1973 period were masked by substantially wetter than average years. Therefore, the suitable level of development occurred prior to the late 60's and early 70's. Without knowing the quantitative abundances of most estuarine species for any years prior to 1967 it is impossible to say at what time the level of development of the water projects was consistent with the habitat needs of estuarine species. EPA's choice of 1968 is the highest possible level of development consistent with these findings.

It is unclear how the CUWA/Ag staff arrived at 1971.5. If the late 60's to early 70's is defined as the period from 1968 to 1973, the average would be 1970.5

The Club FED requirement of Chipps Island in all years is based on the extremely low level of variability on this parameter in the historical record from 1930 to 1978. If a trigger for this requirement is felt to be necessary there appear to be two possible justifications:

> A substantial reduction in water cost in the driest years would be found by making the February requirement the same as the March requirement. This approach would reduce the inconsistency in the protective level as the projects move from February to March. This would imply a trigger at approximately 0.8 MAF unimpaired flow in January.
>
> Alternatively, one could look only at the "super-critical" years that the Ag/Urban group suggests are the reason for this concern and tie the trigger to the highest January unimpaired flows that occurred in those cases. Total unimpaired flows in 1977, 1924 and 1931 were less than 7.8 MAF whereas all other years had more than 10 MAF. If these are the only "super-critical" years, then the trigger for Chipps Island could be 0.8 MAF unimpaired runoff for January (the highest unimpaired flows that occurred in these three years). This, however, would result in 19 out of 86 years not having a Chipps requirement in February, substantially more that the 2 years in EPA's proposal.

Note that either of these justification ignore the fact that, until 1976, salinities at Chipps Island in February had been less than 2 ppt in every year.

The Fish and Wildlife Service staff agrees in concept to the X2 requirements, but believes that 1) San Joaquin flow contributions are an integral part of their interpretation of the requirement and 2) they must require that X2 physically attain the confluence. They maintain that the standards must be written to protect the vast majority of years, accounting for very dry conditions separately. They believe that the requirements must provide for some days with X2 physically measured at the confluence to ensure the necessary habitat conditions. The Service staff have indicated concerns with the flow levels in the late spring in the Ag/Urban proposal, and in that the differences between the two proposals may be significant.

4. Cross Channel Closures

Issue

The only significant disagreement identified was the closure in June in the Club FED proposal. The Ag/Urban group considered the comments on measures for spring-run salmon and, as a result of these discussions, has included in the draft proposal a 30 day closure in November through January based upon monitoring parameters (including flows and turbidity as well as fish

monitoring, as suggested in the meeting). Alternative June closure schemes (weekdays only) were suggested and are being considered by the Ag/Urban group.

Summary of the disagreement
The Ag/Urban draft proposal does not provide for a closure in June. It was suggested that this is beneficial to late outmigrating salmon.

Technical basis for the Ag/Urban Draft Proposal (submitted by the Ag/Urban group)
The Ag/Urban group did not propose the June period for closure because of conflicts with recreational uses in the Delta (the closure significantly affects boaters in the Delta). Alternatives have been proposed, and the group is considering a proposal that would close the cross-channel on portions of the week, as a means of meeting the needs of both fisheries and recreational users.

Technical basis for the disagreement (submitted by the Club FED group)
Significant numbers of fall-run chinook salmon for the Sacramento River would be protected by closure of the Cross Channel gate in late May and June. As proposed by Ag/Urban the opening of the gate on May 20 would allow large numbers of fall-run chinook smolts (see table 4, Attachment 2) to enter the central Delta where survival will be significantly reduced by predation, high water temperature, poor water quality, entrainment by unscreened diversions, etc.

A survival goal is an integral part of the Club FED plan and is considered necessary to insure the cross channel gate closures and export restrictions are performing as expected. The survival goal will also allow revision if new, better protection measures can be implemented in the future.

5. Striped Bass and Warm Water Spawning Standards

Issue
The Ag/Urban draft proposal does not include specific measures on the San Joaquin River for warm water fish spawning. This appears to be more of a policy question than a technical issue. Brief summaries are presented here.

Summary of the disagreement
The Department of Fish and Game disagreed with the absence of specific measures to protect and enhance the striped bass population. While the Ag/Urban proposal does not include specific measures for striped bass, the overall proposal will benefit the striped bass population. The Ag/Urban proposal does not include the EPA warm water spawning standards in the San Joaquin River downstream of Vernalis.

Basis for the Ag/Urban Position (submitted by the Ag/Urban group)

The Ag/Urban proposal does not include specific, additional measures to enhance striped bass populations attributable to San Joaquin River spawning. It is considered to be unnecessary, at this time, to revise the striped bass protections adopted in the 1991 Water Quality Control Plan. This recommendation is based on 1) fishery resource management concerns, 2) the scientific

evidence concerning the needs of spawning striped bass, and 3) regulations that prohibit the dilution of pollutants with fresh water releases.

Technical basis for the disagreement (submitted by the Club FED group)
No comments submitted. The Club FED proposal is part of the draft EPA standards.

6. Issues on which clarification was requested

Measures for spring-run salmon and for rearing of salmon in the Delta in the late fall
A lack of specific measures for spring-run salmon and for the rearing of salmon in the Delta in the late fall was noted by USFWS. The Ag/Urban group has considered these comments and has subsequently incorporated Delta cross-channel closures for up to 30-days from November through January, based upon monitoring, to address this issue.

Category III - Legal Fishing
The inclusion of legal fishing limits as part of SWRCB requirements was objected to by the Department of Fish and Game. This was raised as a policy issue, and possibly a technical issue. It was stated that this is regulated independently and takes into account the status of the species. This is addressed in the Ag/Urban documentation of the draft proposal.

Monitoring
The use of fish monitoring to determine operational levels was questioned as the basis of feasibility (for low-population species) and because it may result in technical disputes if not properly devised. There was agreement that these are technical issues that need to be addressed to ensure an adequate program is implemented.

Acoustical Barrier
It was suggested that the acoustical barrier be consistently applied on a year round basis. It is recognized by all that the acoustical barrier is still under development and it is still considered experimental.

Attachments
1) Supporting Documentation for the Draft Proposal
2) Supporting Documentation for the Disagreements
3) Synopsis of the October 18, 1994 Meeting

Comparison of Club Fed Proposal and Ag-Urban Water Users' Joint Proposal

November 1, 1994

The attached graphs and data tables are in response to questions raised at the October 18, 1994 meeting between Federal and State agency personnel, environmental organization representatives and members of the Ag-Urban water users' joint proposal technical group.

1. Define a dry & critical year trigger for meeting February X2 requirements at the confluence, i.e. based on previous January 8-River index.

   The Ag/Urban proposal now has a revised sliding scale in February to address the above issue.

   - At the confluence, X2 (with three ways to comply) is required to be met for 28 days.
   - At Chipps Island, there is no X2 requirement when the January 8-River index is less than or equal to 1.5 MAF, and 28 days are required when it is greater than 1.75 MAF. Linear interpolation is used between 1.5 and 1.75 MAF to determine the number of days required.

2. Difference in X2 locations from operations studies between Water Users' proposal and the Club Fed proposal.

   The three sets of bar charts show the February through June average location of X2 from monthly DWRSIM output. The graphs are for the three periods: 1922-1946, 1945-1969, and 1968-1992. Also shown are the X2 values for Roe Island (64 km), Chipps Island (74 km) and Collinsville (81 km).

   The location of X2 was calculated using the monthly Kimmerer-Monismith equation. The DWRSIM studies were Alternative J (water users proposal) and 371 (first of three recent studies by DWR for EPA). DWR's description of the three recent studies, 371, 372 and 373, is also attached.

   A table of February-June average X2 locations for four DWRSIM studies for the period 1922-1992 is also attached. The additional studies are for D1485 with the 1994 Endangered Species Act requirements (DWRSIM study 274) and D1485 only (DWRSIM study 272B).

3. Month to month variation in historical exports and export/inflow ratios (with and without proposed limits)

Three sets of line graphs of monthly historical exports at the Tracy and Banks export pumping plants are attached: 1968-1976, 1977-1984 and 1985-1992. The historical data (dashed line) are from DAYFLOW.

Note that in these graphs, values for calendar year 1968, for example, are plotted from 68.0 to 68.99. The change from June 1968 to July 1968 occurs at about 68.5.

Also plotted are the Tracy and Banks exports assuming only the Ag-Urban water users' proposed export limitations (export/inflow percentages and the 100% export/San Joaquin ratio). In other words, the DAYFLOW exports are reduced where necessary according to these export limitations but no other flow changes such as minimum Delta outflow requirements were made. CCWD's model does not include any reoperation of reservoirs upstream of the Delta so no attempt was made to recover export losses in other months.

This study illustrates that the Ag-Urban water users' export limitations alone represent a significant potential reduction in exports from historical values.

The next three sets of line graphs show the corresponding export/inflow percentages for the monthly historical exports at the Tracy and Banks export pumping plants (1968-1976, 1977-1984 and 1985-1992). The export/inflow limits proposed by the Ag-Urban water users and the resulting reduction from historical export/inflow ratio are also shown.

A table of the monthly variations in DAYFLOW historical exports and export/inflow ratios, the proposed limitations under the water users' proposal and the resulting reduction in exports and export/inflow ratios (assuming only the export limitations are in place) is also attached.

4. Comparison of Tracy and Banks Export/Inflow ratios from historical DAYFLOW data and water users proposals - drier and wetter year averages

Four pages of export/inflow ratio data showing the years 1967 through 1992 classified as drier years (critical and dry years, based on the 40-30-30 Sacramento River index) and wetter years (below normal, above normal and wet years). Note that the water year type is assumed to change on February 1 each year.

Each page shows three months of historical DAYFLOW export/inflow ratios and, below, three months of export/inflow ratios with the full Ag-Urban water users' proposal (using CCWD's additional outflow model). The bars in each graph have different patterns depending on water year type (solid bars are the critical years). the bars in the two categories (drier and wetter years) are in chronological order.

The four pages of graphs show January through March, April through June, July through September, and October through December, respectively.

Table:
Average Export/Inflow ratios for each month categorized according to drier and wetter years.

	Historical		Water Users	
Mth	Ave Dry/Crt	Ave BN,AN&Wet	Ave Dry/Crt	Ave BN,AN&Wet
Jan	45.1%	14.9%	41.6%	14.7%
Feb	46.2%	8.5%	42.0%	8.4%
Mar	43.5%	9.1%	26.8%	9.0%
Apr	42.2%	16.4%	20.3%	12.8%
May	34.3%	19.6%	20.6%	15.9%
Jun	29.8%	25.1%	22.1%	21.1%
Jul	35.0%	31.7%	28.0%	27.2%
Aug	45.8%	37.4%	42.7%	36.8%
Sep	50.6%	26.7%	46.4%	26.5%
Oct	45.1%	26.4%	40.8%	26.1%
Nov	43.2%	20.6%	39.3%	20.6%
Dec	40.8%	16.2%	38.7%	16.2%

5. Comparison of Tracy and Banks Exports frequency/magnitude data for the water users and Club Fed proposals

Twelve histograms of Tracy and Banks export pumping data, one per month (two graphs per page), are attached. The data plotted are the 71 monthly export values for a given month for the period 1922-1992 from three DWRSIM studies: Water Users (Alternative J study), Club Fed (study 371) and D1485 only (study 272B).

Six pages of monthly export data, sorted by month, two months per page, are also attached. In addition to the three DWRSIM studies listed above, the output from DWRSIM study 274, D1485 with the 1994 Endangered Species Act requirements, are also tabulated.

6. Comparison of QWEST frequency/magnitude data for the water users and Club Fed proposals

Twelve histograms of QWEST data, one per month (two graphs per page), are attached. The data plotted are the 71 monthly values for a given month for the period 1922-1992 from three DWRSIM studies: Water Users (Alternative J study), Club Fed (study 371) and D1485 only (study 272B). Values of QWEST greater than 10,000 cfs are not plotted.

Six pages of monthly QWEST data, sorted by month, two months per page, are also attached. In addition to the three DWRSIM studies listed above, the output from DWRSIM study 274, D1485 with the 1994 Endangered Species Act requirements, are also tabulated.

7. Analyze smolt survival on the San Joaquin River

An analysis of salmon smolt survival indices has been carried out by Dan Steiner. The results are presented as a bar graph showing the calculated smolt survival indices for 1965-1993 classified according to water year type. Results are presented for the historical flows, the water users' proposal with and without the Old River barrier and the Club Fed (EPA) with and without the Old River barrier. A table of results and a description of procedures used to compute the survival indices are also included.

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STUDY ASSUMPTIONS
CLUB FED PROPOSALS (OCTOBER, 1994)

STUDY 1995C6B-CFED-371 (Run #1)

1. The water quality standards in 1991 Water Quality Control Plan for Salinity (1991 Bay-Delta Plan).

2. The flow and export standards for the protection of fish and wildlife in D-1485.

3. The X2 isohaline standard contained in study 2' (1968 level of development with Roe Island triggered), as described in the Jun 10, 1994 letter from EPA to DWR.

4. Vernalis Pulse Flows (April 15 - May 15) vary between 2,300 & 10,000 cfs as a function of WYr Index (as described in the Aug. 17, 1994 letter from EPA).

5. Total Delta Export limits are as described in the Aug. 17, 1994 letter from EPA, as follows:

4/1 - 4/14	between 2,000 & 6,000 cfs as function of WYr Index.
4/15 - 5/15	1500 cfs for all year types.
5/16 - 5/31	between 2,000 & 6,000 cfs as function of WYr Index.
6/1 - 6/30	between 4,000 & 6,000 cfs as function of WYr Index.

6. QWEST Flow requirements:

11/1 - 1/31	-2000 CFS
2/1 - 2/28	0 CFS
3/1 - 3/31	+2000 CFS
4/1 - 4/30	0 CFS

7. Delta Cross-Channel Gate Positions:

Nov - Dec: Gates closed for 10 days per month (total 20 days).
Feb 01 - Jun 30: Gates closed at all times.

STUDY 1995C6B-CFED-372 (Run #2)

This study meets all above requirements (Study 371), except for the following changes:

1. QWEST Flow requirements:

11/1 - 1/31	-2000 CFS
2/1 - 2/28	0 CFS
3/1 - 3/31	+2000 CFS
4/1 - 4/30	+1000 CFS

2. Delta Cross-Channel Gate Positions:

Nov - Jan: Gates closed 15 days per month (total 45 days).
Feb 01 - Jun 30: Gates closed at all times.

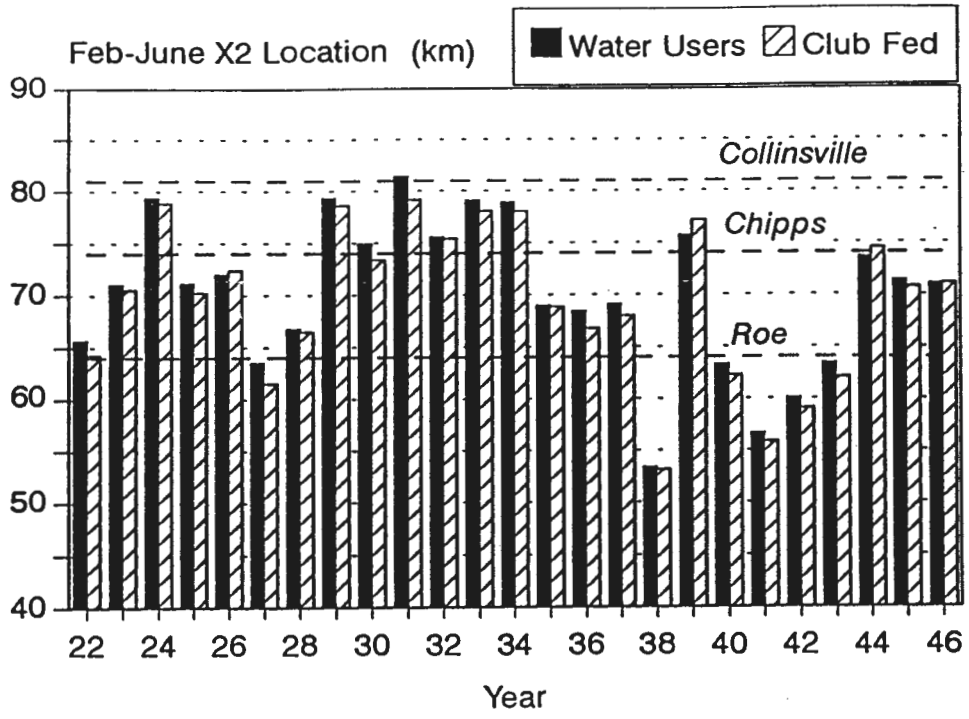
STUDY 1995C6B-CFED-373

This study meets all requirements from Study-372 above, except for the following changes:

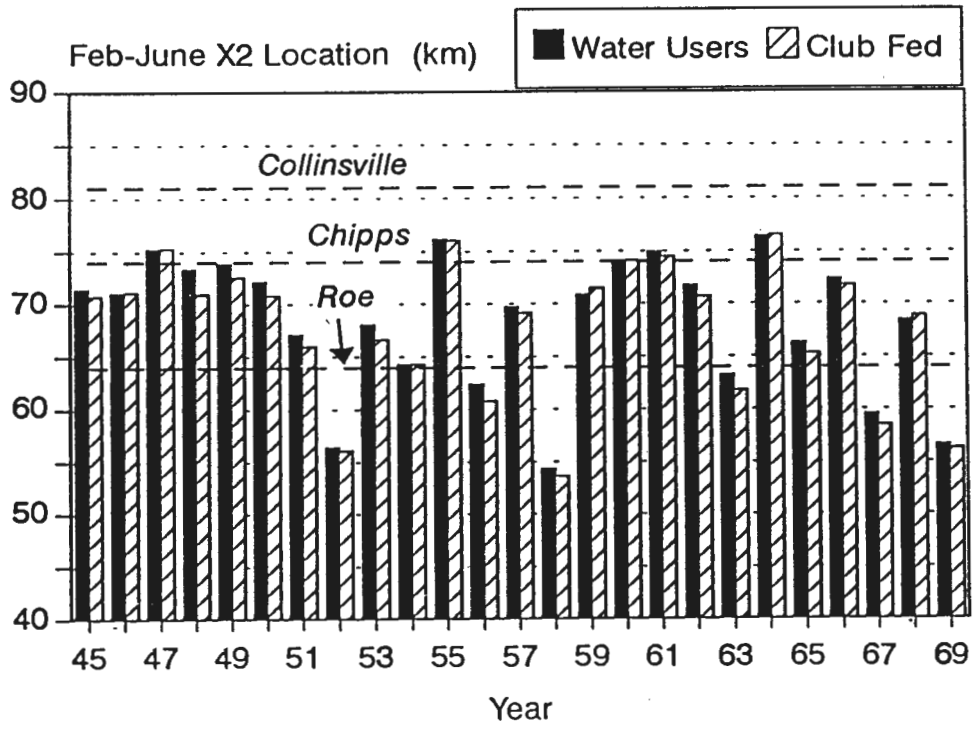
1. QWEST Flow requirements:

11/1 - 1/31	No Standard
2/1 - 2/28	0 CFS
3/1 - 3/31	+2000 CFS
4/1 - 4/30	+1000 CFS

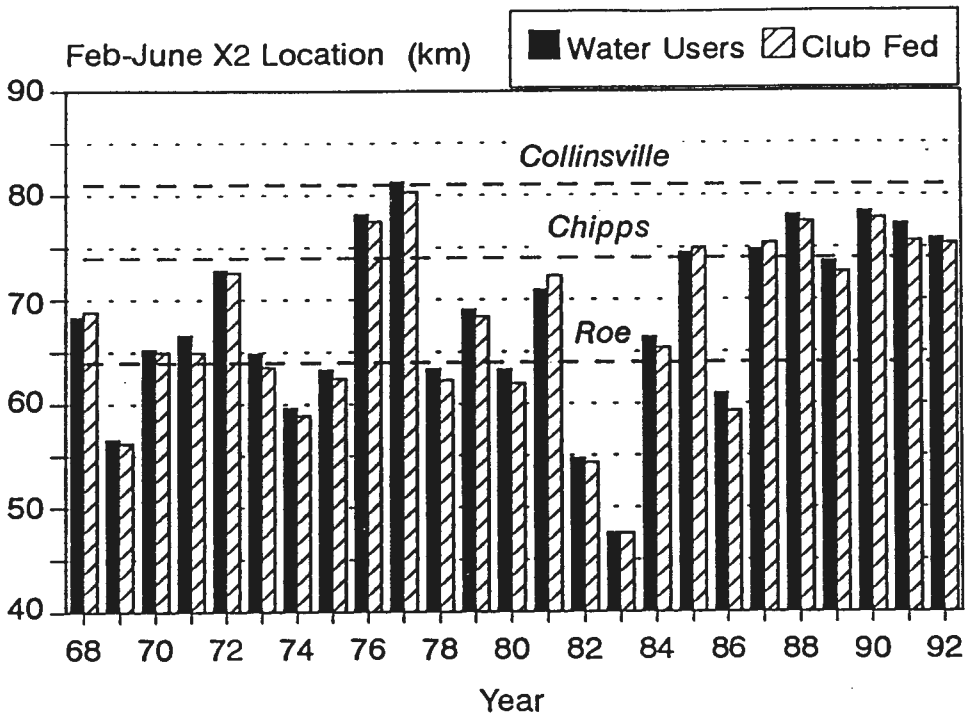
Average X2 Location (February-June)
DWRSIM 1922-1946



Average X2 Location (February-June)
DWRSIM 1945-1969



Average X2 Location (February-June)
DWRSIM 1968-1992



February-June Average X2 Location (km)

DWRSIM Output

X2(t) = 122.2 + 0.3278*X2(t-1) - 17.65*LOG(Q)

(Initial X2 = 74 km on September 1921)

Year	Water Users	Club ClubFed	D1485+ 94 ESA	D1485 Base
1922	65.67	64.28	65.31	65.59
1923	71.03	70.55	72.93	74.44
1924	79.41	78.87	81.75	83.76
1925	71.15	70.26	70.40	72.47
1926	72.06	72.38	74.40	76.56
1927	63.52	61.52	62.93	62.62
1928	66.77	66.48	66.89	68.93
1929	79.37	78.62	80.68	83.62
1930	74.98	73.40	74.94	76.38
1931	81.44	79.16	82.29	85.91
1932	75.56	75.42	77.14	79.71
1933	79.13	78.05	80.83	85.00
1934	78.94	78.02	80.16	85.13
1935	68.99	68.86	70.64	71.39
1936	68.44	66.77	67.73	68.92
1937	69.13	67.99	69.48	70.22
1938	53.38	53.17	53.04	52.89
1939	75.72	77.16	80.40	81.33
1940	63.31	62.23	62.62	62.94
1941	56.69	55.90	56.31	56.27
1942	60.04	59.05	59.70	59.82
1943	63.42	62.04	63.07	63.27
1944	73.65	74.46	75.41	76.28
1945	71.36	70.74	71.87	72.45
1946	71.04	71.10	71.33	72.89
1947	75.23	75.32	76.41	78.70
1948	73.32	70.96	73.39	75.64
1949	73.84	72.53	75.02	76.75
1950	72.14	70.79	72.19	74.56
1951	67.08	66.01	67.28	68.55
1952	56.40	56.10	56.18	56.08
1953	68.05	66.62	67.90	68.44
1954	64.28	64.30	65.21	65.49
1955	76.13	76.06	77.24	80.27
1956	62.38	60.79	61.92	62.46
1957	69.69	69.12	70.63	71.52
1958	54.35	53.62	53.85	53.75
1959	70.87	71.45	73.04	73.84

February-June Average X2 Location (km)

DWRSIM Output

X2(t) = 122.2 + 0.3278*X2(t-1) - 17.65*LOG(Q)

(Initial X2 = 74 km on September 1921)

Year	Water Users	Club ClubFed	D1485+ 94 ESA	D1485 Base
1960	74.09	74.09	74.62	76.58
1961	74.93	74.45	76.38	78.32
1962	71.69	70.64	71.45	73.34
1963	63.25	61.82	63.08	62.96
1964	76.42	76.53	77.24	80.42
1965	66.33	65.29	66.88	67.92
1966	72.28	71.72	73.60	74.29
1967	59.55	58.48	58.71	58.49
1968	68.39	68.85	69.90	70.82
1969	56.58	56.24	56.24	56.20
1970	65.28	65.01	65.42	67.55
1971	66.61	64.99	66.25	67.08
1972	72.84	72.58	73.78	74.80
1973	64.88	63.58	64.46	65.21
1974	59.67	58.91	59.63	59.51
1975	63.30	62.47	63.03	63.38
1976	78.17	77.47	79.58	82.45
1977	81.30	80.30	82.34	86.14
1978	63.39	62.29	62.70	62.67
1979	69.08	68.42	70.94	71.15
1980	63.35	62.00	62.43	62.39
1981	70.97	72.33	73.32	73.83
1982	54.72	54.30	54.30	54.22
1983	47.56	47.50	47.56	47.56
1984	66.45	65.42	66.75	68.23
1985	74.51	74.91	76.32	76.80
1986	60.99	59.29	60.46	61.22
1987	74.78	75.41	78.08	79.11
1988	78.05	77.44	81.50	82.95
1989	73.63	72.66	73.65	77.05
1990	78.43	77.80	80.88	84.07
1991	77.25	75.63	78.76	82.55
1992	75.86	75.36	77.96	80.65
AVE	69.05	68.37	69.73	71.05

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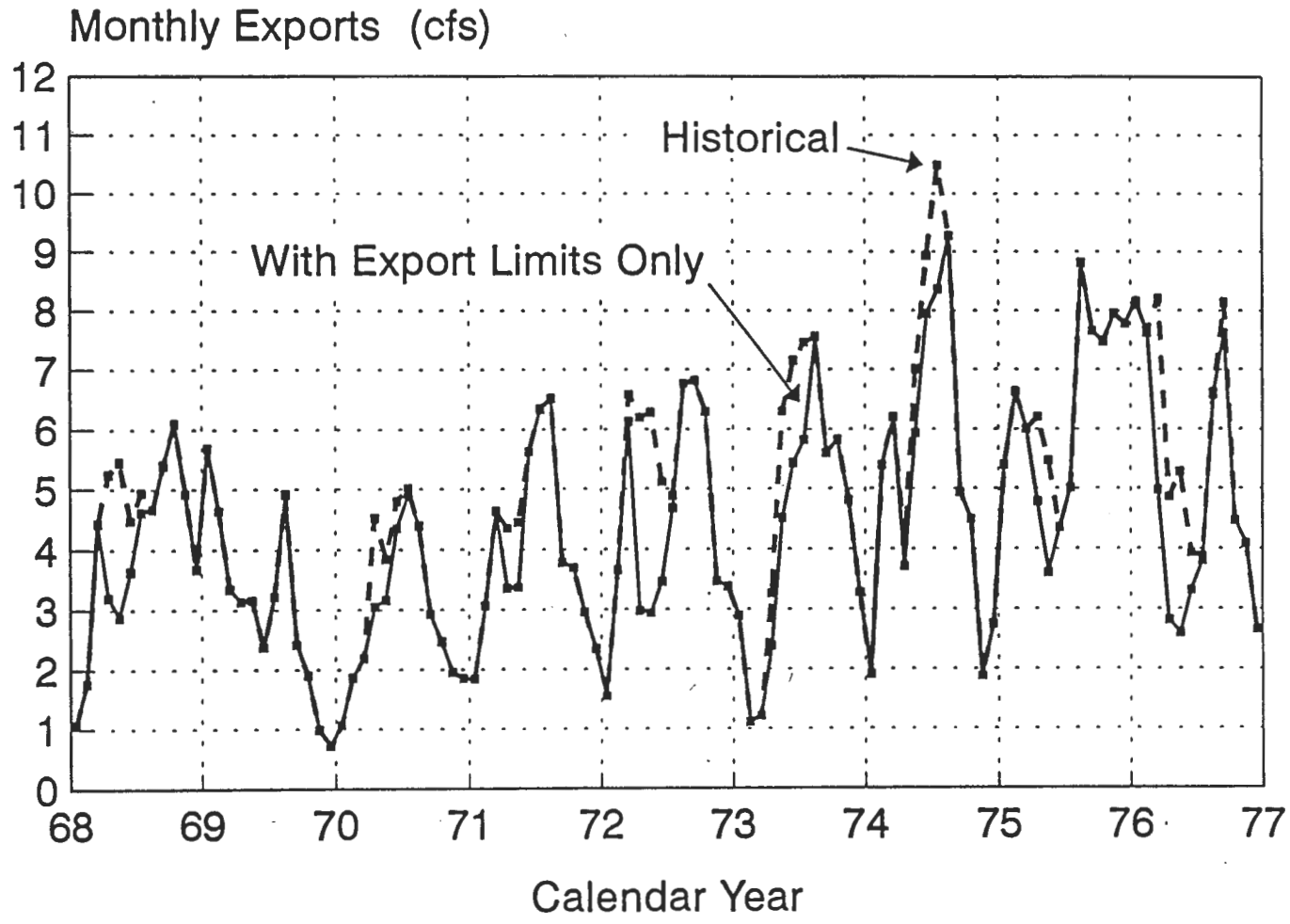
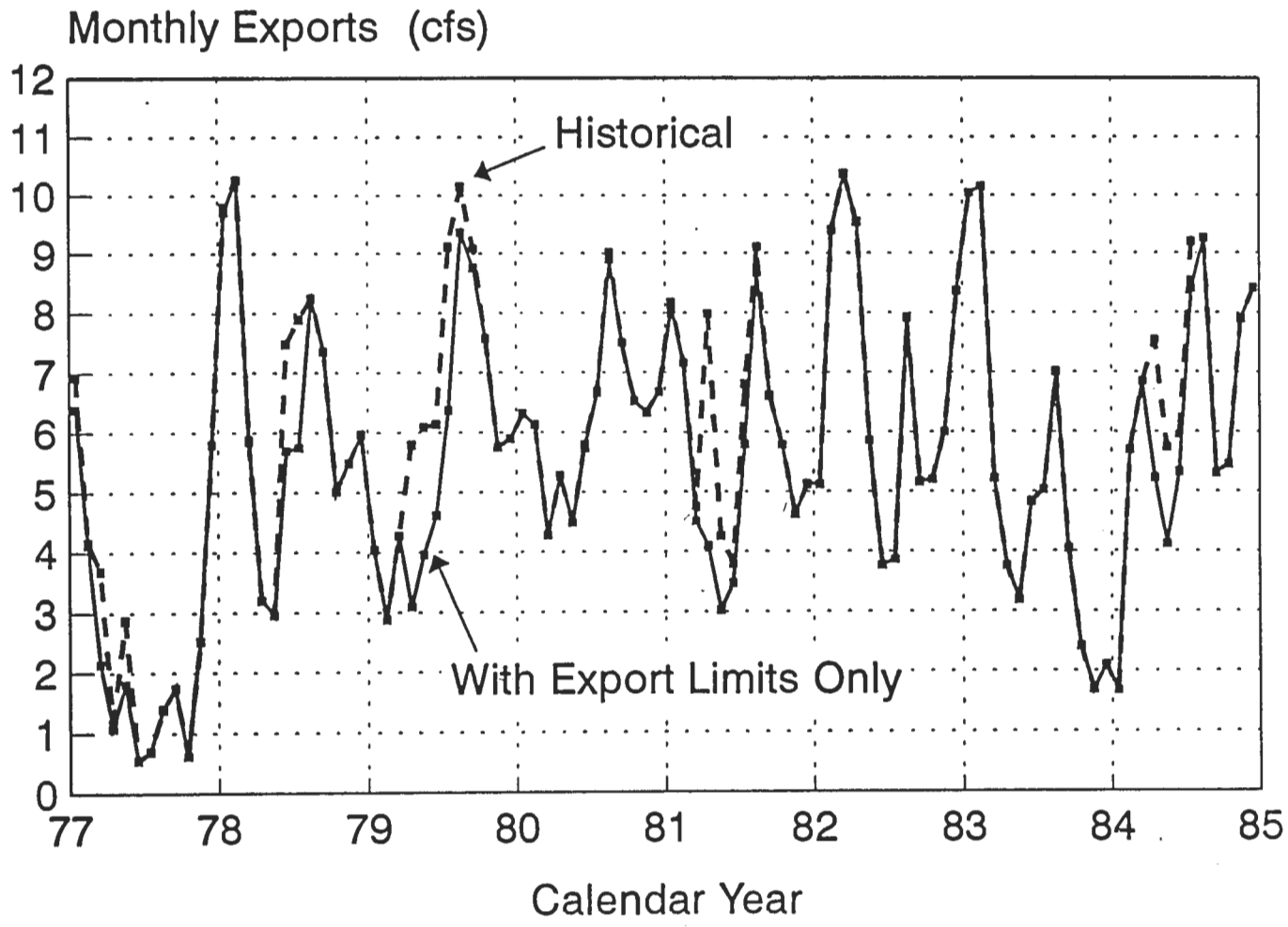
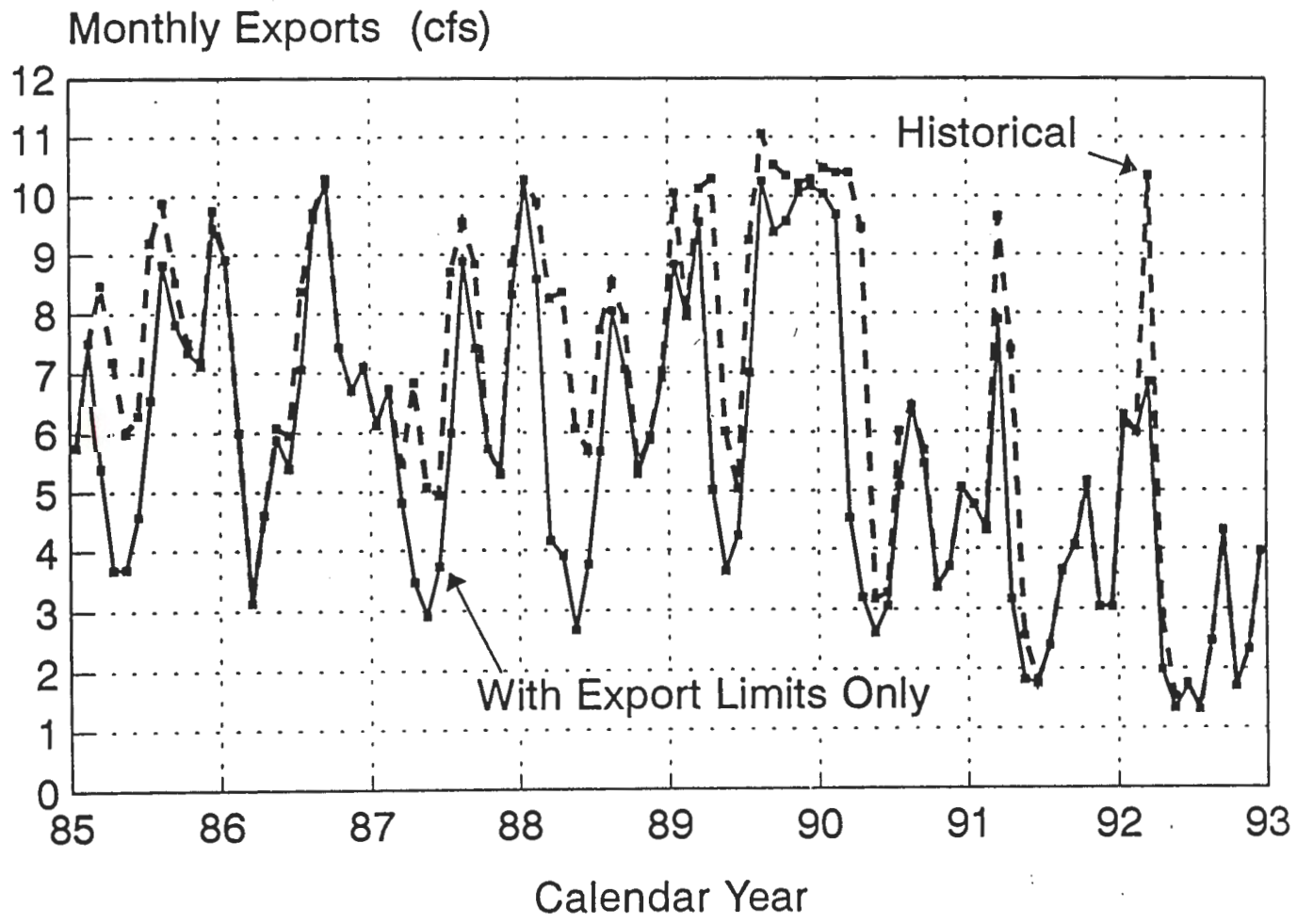
Tracy and Banks Export Pumping
Historical DAYFLOW data and G-Model reoperation
With Export Limits Only



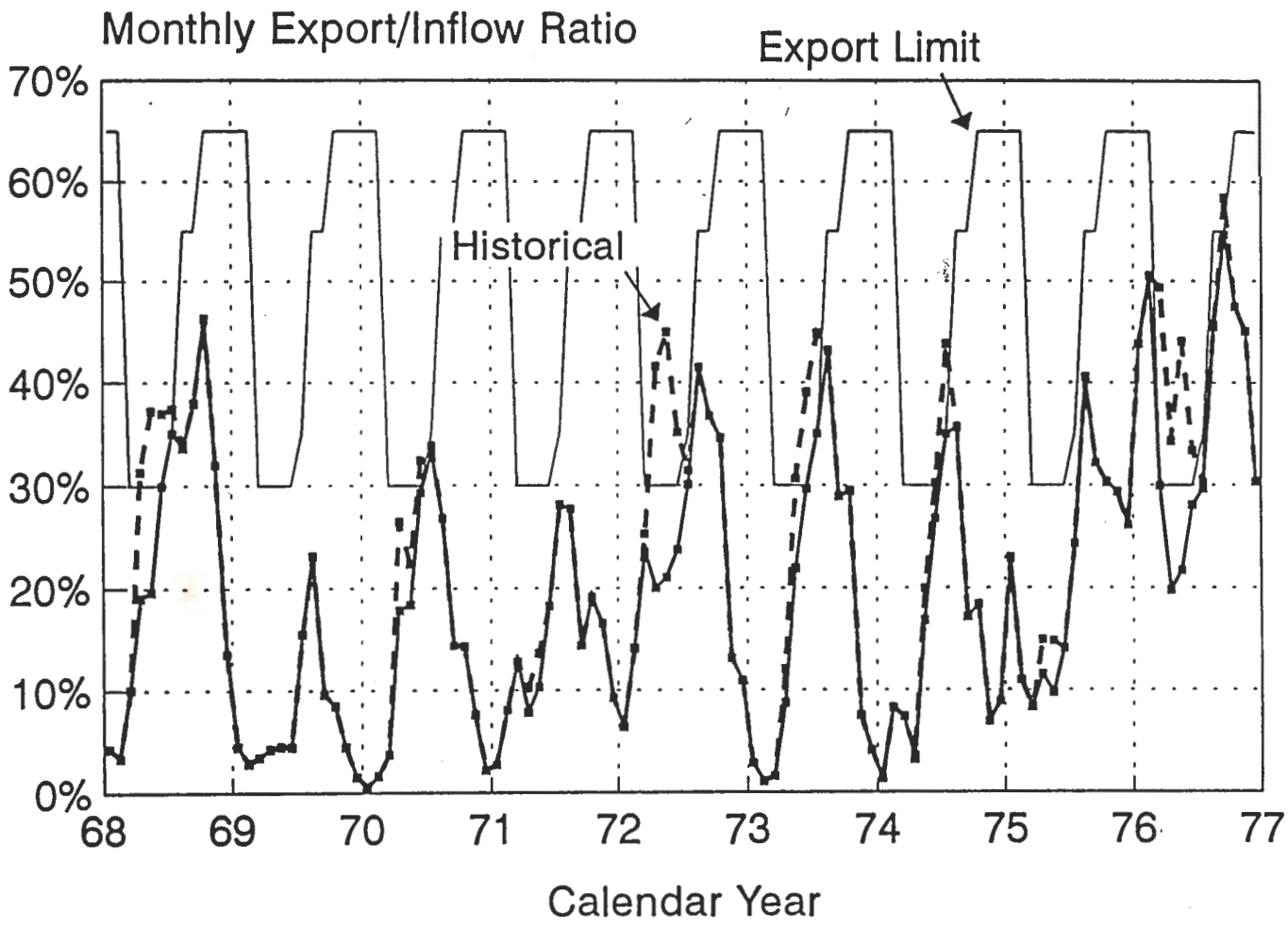
Tracy and Banks Export Pumping
Historical DAYFLOW data and G-Model reoperation
With Export Limits Only



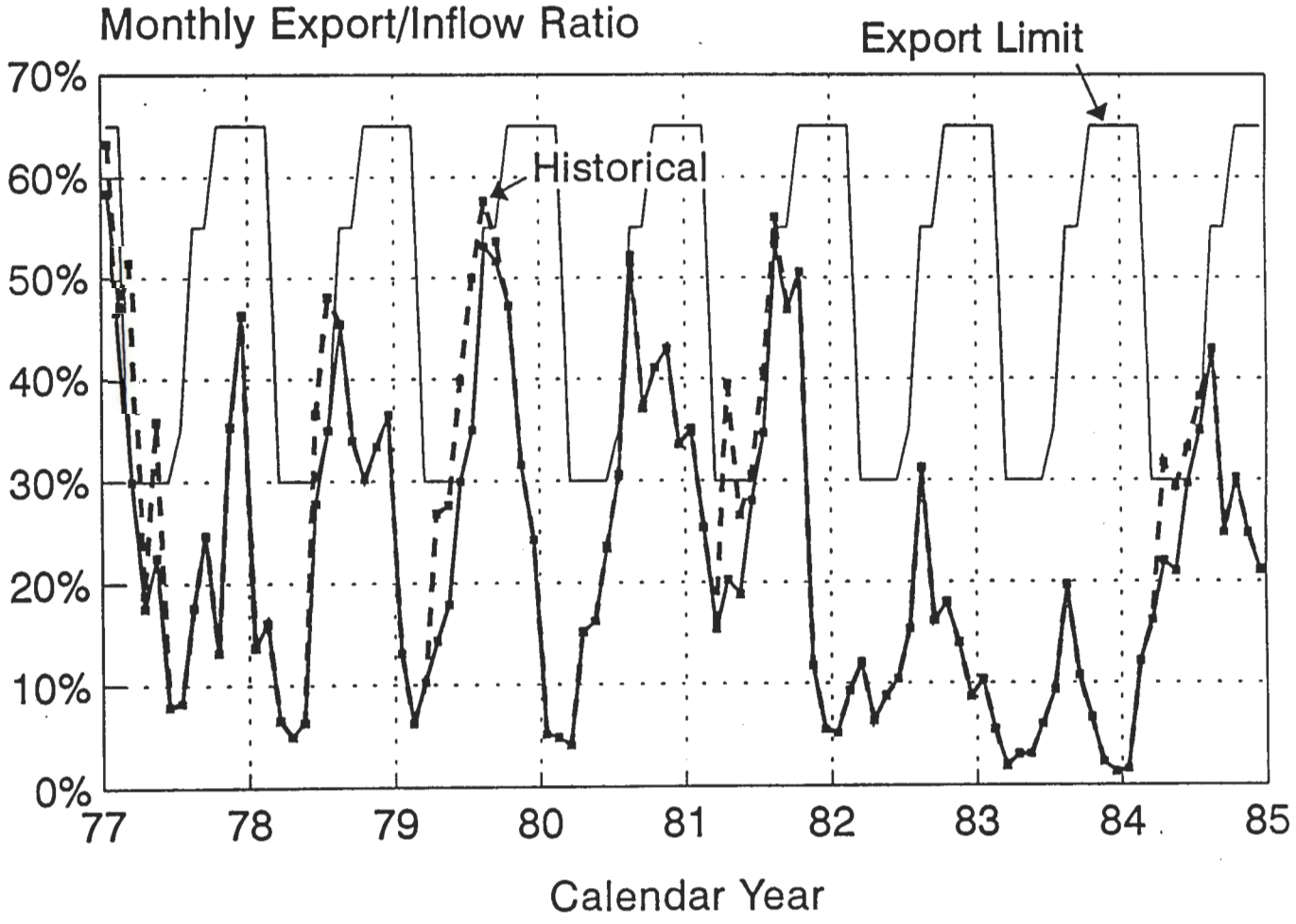
Tracy and Banks Export Pumping
Historical DAYFLOW data and G-Model reoperation
With Export Limits Only



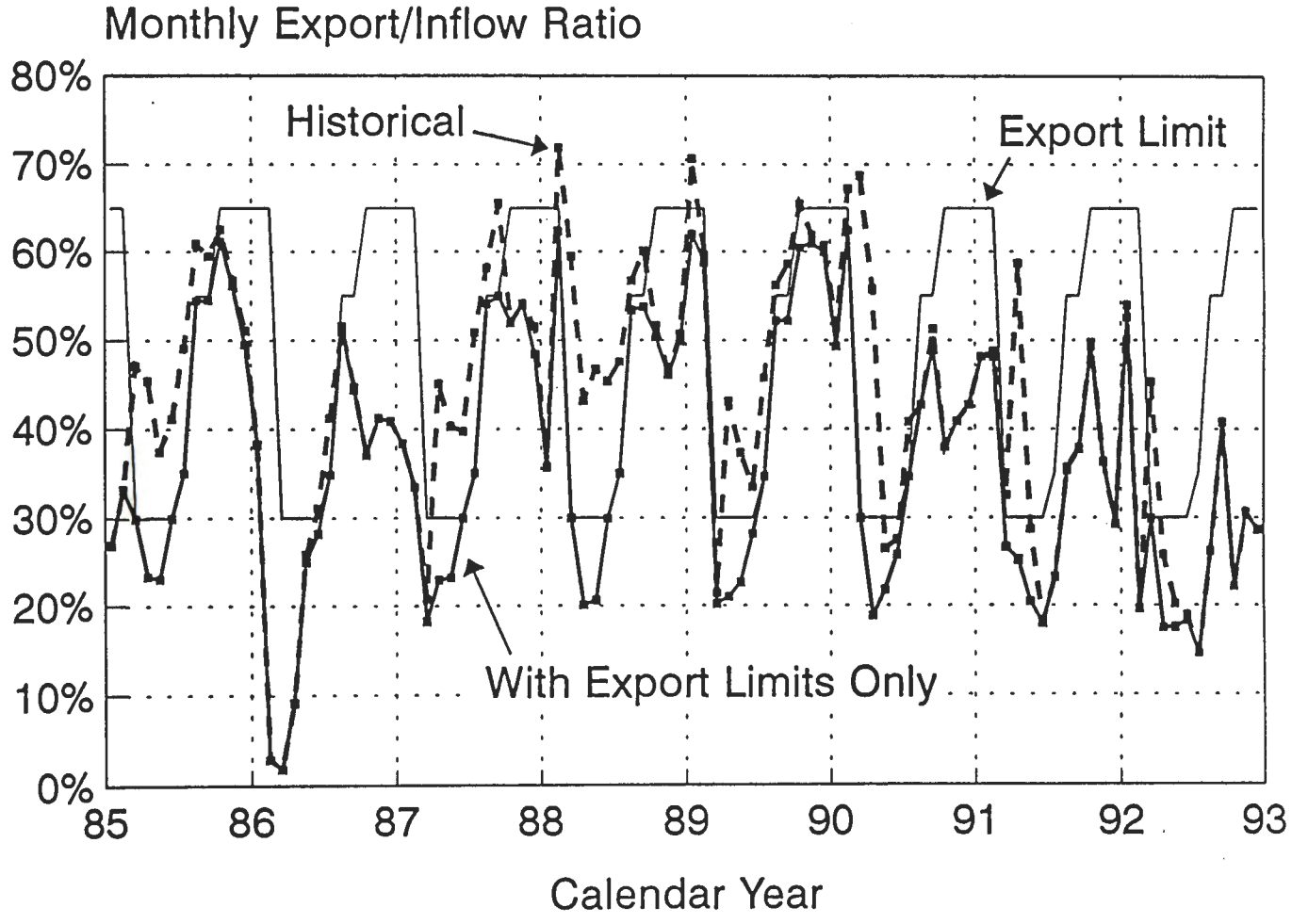
Export/Inflow Percentage
Historical DAYFLOW data and G-Model reoperation
With Export Limits Only



Export/Inflow Percentage
Historical DAYFLOW data and G-Model reoperations
With Export Limits Only



Export/Inflow Percentage
Historical DAYFLOW data and G-Model reoperation
With Export Limits Only



Month to Month Variation in Historical Exports
and Export/Inflow Ratios
With and Without Proposed Limits

		Historical				Reoperated		
		Exports	Inflow	EXP/INF	Limit	Exports	Inflow	EXP/INF
Year	Mth	cfs	cfs	%	%	cfs	cfs	%
1968	1	1077	24918	4.3	65	1077	24918	4.3
1968	2	1768	51525	3.4	65	1768	51525	3.4
1968	3	4435	43821	10.1	30	4435	43821	10.1
1968	4	5250	16778	31.3	30	3209	16778	19.1
1968	5	5452	14642	37.2	30	2881	14642	19.7
1968	6	4484	12121	37.0	30	3636	12121	30.0
1968	7	4944	13203	37.4	35	4621	13203	35.0
1968	8	4674	13918	33.6	55	4674	13918	33.6
1968	9	5417	14239	38.0	55	5402	14239	37.9
1968	10	6099	13174	46.3	65	6099	13174	46.3
1968	11	4928	15425	31.9	65	4928	15425	31.9
1968	12	3677	27076	13.6	65	3677	27076	13.6
1969	1	5688	125525	4.5	65	5688	125525	4.5
1969	2	4647	159489	2.9	65	4647	159489	2.9
1969	3	3349	96730	3.5	30	3349	96730	3.5
1969	4	3139	73267	4.3	30	3139	73267	4.3
1969	5	3162	69928	4.5	30	3162	69928	4.5
1969	6	2381	52546	4.5	30	2381	52546	4.5
1969	7	3228	20746	15.6	35	3228	20746	15.6
1969	8	4921	21261	23.1	55	4921	21261	23.1
1969	9	2421	25034	9.7	55	2421	25034	9.7
1969	10	1902	22274	8.5	65	1902	22274	8.5
1969	11	994	22001	4.5	65	994	22001	4.5
1969	12	727	46101	1.6	65	727	46101	1.6
1970	1	1067	188895	0.6	65	1067	188895	0.6
1970	2	1866	112760	1.7	65	1866	112760	1.7
1970	3	2193	58170	3.8	30	2193	58170	3.8
1970	4	4524	17072	26.5	30	3057	17072	17.9
1970	5	3845	17178	22.4	30	3169	17178	18.4
1970	6	4800	14824	32.4	30	4350	14824	29.3
1970	7	5016	14836	33.8	35	4911	14836	33.1
1970	8	4394	16341	26.9	55	4394	16341	26.9
1970	9	2928	20308	14.4	55	2928	20308	14.4
1970	10	2469	17224	14.3	65	2469	17224	14.3
1970	11	1952	25409	7.7	65	1952	25409	7.7
1970	12	1852	84076	2.2	65	1852	84076	2.2
1971	1	1841	66332	2.8	65	1841	66332	2.8
1971	2	3074	37792	8.1	65	3074	37792	8.1
1971	3	4631	36105	12.8	30	4631	36105	12.8
1971	4	4351	42364	10.3	30	3360	42364	7.9
1971	5	4452	32524	13.7	30	3377	32524	10.4
1971	6	5627	30695	18.3	30	5627	30695	18.3
1971	7	6344	22515	28.2	35	6336	22515	28.1
1971	8	6520	23474	27.8	55	6520	23474	27.8
1971	9	3779	26192	14.4	55	3779	26192	14.4
1971	10	3694	19310	19.1	65	3694	19310	19.1
1971	11	2962	17833	16.6	65	2962	17833	16.6
1971	12	2344	25150	9.3	65	2344	25150	9.3
1972	1	1549	23849	6.5	65	1549	23849	6.5
1972	2	3661	25859	14.2	65	3661	25859	14.2
1972	3	6588	26036	25.3	30	6133	26036	23.6
1972	4	6196	14889	41.6	30	2983	14889	20.0
1972	5	6282	13979	44.9	30	2944	13979	21.1
1972	6	5121	14573	35.1	30	3465	14573	23.8

Month to Month Variation in Historical Exports
and Export/Inflow Ratios
With and Without Proposed Limits

		Historical				Reoperated		
		Exports	Inflow	EXP/INF	Limit	Exports	Inflow	EXP/INF
Year	Mth	cfs	cfs	%	%	cfs	cfs	%
1972	7	4893	15564	31.4	35	4686	15564	30.1
1972	8	6771	16328	41.5	55	6771	16328	41.5
1972	9	6817	18560	36.7	55	6817	18560	36.7
1972	10	6300	18231	34.6	65	6300	18231	34.6
1972	11	3472	26341	13.2	65	3472	26341	13.2
1972	12	3384	30864	11.0	65	3384	30864	11.0
1973	1	2899	100445	2.9	65	2899	100445	2.9
1973	2	1114	100905	1.1	65	1114	100905	1.1
1973	3	1216	75981	1.6	30	1216	75981	1.6
1973	4	3268	27115	12.1	30	2395	27115	8.8
1973	5	6311	20603	30.6	30	4519	20603	21.9
1973	6	7161	18313	39.1	30	5434	18313	29.7
1973	7	7461	16644	44.8	35	5825	16644	35.0
1973	8	7557	17522	43.1	55	7557	17522	43.1
1973	9	5601	19346	29.0	55	5601	19346	29.0
1973	10	5822	19751	29.5	65	5822	19751	29.5
1973	11	4819	63291	7.6	65	4819	63291	7.6
1973	12	3283	79012	4.2	65	3283	79012	4.2
1974	1	1917	139274	1.4	65	1917	139274	1.4
1974	2	5397	64756	8.3	65	5397	64756	8.3
1974	3	6209	83123	7.5	30	6209	83123	7.5
1974	4	4125	113459	3.6	30	3707	113459	3.3
1974	5	7015	35108	20.0	30	5937	35108	16.9
1974	6	8942	29571	30.2	30	7949	29571	26.9
1974	7	10493	23957	43.8	35	8370	23957	34.9
1974	8	9281	26042	35.6	55	9281	26042	35.6
1974	9	4940	28668	17.2	55	4940	28668	17.2
1974	10	4496	24398	18.4	65	4496	24398	18.4
1974	11	1878	26812	7.0	65	1878	26812	7.0
1974	12	2755	30721	9.0	65	2755	30721	9.0
1975	1	5405	23540	23.0	65	5405	23540	23.0
1975	2	6634	60242	11.0	65	6634	60242	11.0
1975	3	6005	71361	8.4	30	6005	71361	8.4
1975	4	6207	41473	15.0	30	4784	41473	11.5
1975	5	5471	36812	14.9	30	3608	36812	9.8
1975	6	4353	30754	14.2	30	4353	30754	14.2
1975	7	5010	20565	24.4	35	5010	20565	24.4
1975	8	8817	21746	40.5	55	8817	21746	40.5
1975	9	7662	23839	32.1	55	7662	23839	32.1
1975	10	7474	24647	30.3	65	7474	24647	30.3
1975	11	7949	27059	29.4	65	7949	27059	29.4
1975	12	7778	29674	26.2	65	7778	29674	26.2
1976	1	8158	18615	43.8	65	8158	18615	43.8
1976	2	7628	15081	50.6	65	7628	15081	50.6
1976	3	8207	16618	49.4	30	4985	16618	30.0
1976	4	4865	14200	34.3	30	2819	14200	19.9
1976	5	5280	11987	44.0	30	2604	11987	21.7
1976	6	3930	11782	33.4	30	3314	11782	28.1
1976	7	3876	12804	30.3	35	3800	12804	29.7
1976	8	6624	14481	45.7	55	6591	14481	45.5
1976	9	8140	13938	58.4	55	7625	13938	54.7
1976	10	4471	9405	47.5	65	4471	9405	47.5
1976	11	4082	9059	45.1	65	4082	9059	45.1
1976	12	2659	8767	30.3	65	2659	8767	30.3

Month to Month Variation in Historical Exports
and Export/Inflow Ratios
With and Without Proposed Limits

		Historical				Reoperated		
		Exports	Inflow	EXP/INF	Limit	Exports	Inflow	EXP/INF
Year	Mth	cfs	cfs	%	%	cfs	cfs	%
1977	1	6927	10946	63.3	65	6391	10946	58.4
1977	2	4175	8833	47.3	65	4127	8833	46.7
1977	3	3688	7150	51.6	30	2145	7150	30.0
1977	4	1176	6199	19.0	30	1096	6199	17.7
1977	5	2877	8029	35.8	30	1806	8029	22.5
1977	6	557	7007	7.9	30	557	7007	7.9
1977	7	701	8409	8.3	35	701	8409	8.3
1977	8	1388	7828	17.7	55	1388	7828	17.7
1977	9	1734	7030	24.7	55	1734	7030	24.7
1977	10	628	4749	13.2	65	628	4749	13.2
1977	11	2527	7151	35.3	65	2527	7151	35.3
1977	12	5802	12526	46.3	65	5799	12526	46.3
1978	1	9794	70897	13.8	65	9717	70897	13.7
1978	2	10273	63704	16.1	65	10273	63704	16.1
1978	3	5883	88588	6.6	30	5854	88588	6.6
1978	4	3209	63742	5.0	30	3209	63742	5.0
1978	5	2968	46246	6.4	30	2968	46246	6.4
1978	6	7484	20453	36.6	30	5694	20453	27.8
1978	7	7895	16414	48.1	35	5745	16414	35.0
1978	8	8247	18138	45.5	55	8247	18138	45.5
1978	9	7364	21664	34.0	55	7364	21664	34.0
1978	10	5023	16620	30.2	65	5023	16620	30.2
1978	11	5484	16414	33.4	65	5484	16414	33.4
1978	12	5963	16335	36.5	65	5963	16335	36.5
1979	1	4038	30791	13.1	65	4038	30791	13.1
1979	2	2885	45683	6.3	65	2885	45683	6.3
1979	3	4280	41627	10.3	30	4280	41627	10.3
1979	4	5794	21618	26.8	30	3100	21618	14.3
1979	5	6088	22038	27.6	30	3955	22038	17.9
1979	6	6143	15413	39.9	30	4624	15413	30.0
1979	7	9116	18224	50.0	35	6379	18224	35.0
1979	8	10153	17623	57.6	55	9366	17623	53.1
1979	9	9090	16952	53.6	55	8756	16952	51.7
1979	10	7578	16035	47.3	65	7578	16035	47.3
1979	11	5745	18181	31.6	65	5745	18181	31.6
1979	12	5894	24317	24.2	65	5894	24317	24.2
1980	1	6318	120991	5.2	65	6318	120991	5.2
1980	2	6131	125777	4.9	65	6131	125777	4.9
1980	3	4286	103281	4.2	30	4286	103281	4.2
1980	4	5269	34672	15.2	30	5269	34672	15.2
1980	5	4494	27586	16.3	30	4494	27586	16.3
1980	6	5796	24577	23.6	30	5733	24577	23.3
1980	7	6695	21852	30.6	35	6677	21852	30.6
1980	8	9015	17250	52.3	55	8895	17250	51.6
1980	9	7502	20216	37.1	55	7502	20216	37.1
1980	10	6529	15880	41.1	65	6529	15880	41.1
1980	11	6338	14723	43.0	65	6338	14723	43.0
1980	12	6687	19917	33.6	65	6687	19917	33.6
1981	1	8178	23286	35.1	65	8098	23286	34.8
1981	2	7162	28180	25.4	65	7162	28180	25.4
1981	3	4755	29233	16.3	30	4515	29233	15.4
1981	4	7983	20227	39.5	30	4094	20227	20.2
1981	5	4267	16045	26.6	30	3032	16045	18.9
1981	6	3793	12375	30.7	30	3471	12375	28.0

Month to Month Variation in Historical Exports
and Export/Inflow Ratios
With and Without Proposed Limits

		Historical				Reoperated		
		Exports	Inflow	EXP/INF	Limit	Exports	Inflow	EXP/INF
Year	Mth	cfs	cfs	%	%	cfs	cfs	%
1981	7	6808	16695	40.8	35	5792	16695	34.7
1981	8	9112	16261	56.0	55	8677	16261	53.4
1981	9	6625	14119	46.9	55	6615	14119	46.9
1981	10	5787	11441	50.6	65	5787	11441	50.6
1981	11	4632	39336	11.8	65	4632	39336	11.8
1981	12	5127	91853	5.6	65	5127	91853	5.6
1982	1	5127	98112	5.2	65	5127	98112	5.2
1982	2	9402	100549	9.4	65	9402	100549	9.4
1982	3	10369	86350	12.0	30	10369	86350	12.0
1982	4	9550	149356	6.4	30	9550	149356	6.4
1982	5	5859	66304	8.8	30	5859	66304	8.8
1982	6	3765	36044	10.4	30	3765	36044	10.4
1982	7	3860	25011	15.4	35	3860	25011	15.4
1982	8	7913	25319	31.3	55	7913	25319	31.3
1982	9	5167	31759	16.3	55	5167	31759	16.3
1982	10	5202	28817	18.1	65	5202	28817	18.1
1982	11	6004	42769	14.0	65	6004	42769	14.0
1982	12	8367	95552	8.8	65	8367	95552	8.8
1983	1	10045	96861	10.4	65	10045	96861	10.4
1983	2	10155	183046	5.5	65	10155	183046	5.5
1983	3	5221	266621	2.0	30	5221	266621	2.0
1983	4	3755	121793	3.1	30	3755	121793	3.1
1983	5	3198	103031	3.1	30	3198	103031	3.1
1983	6	4841	79795	6.1	30	4841	79795	6.1
1983	7	5035	53418	9.4	35	5035	53418	9.4
1983	8	7016	35542	19.7	55	7016	35542	19.7
1983	9	4050	37543	10.8	55	4050	37543	10.8
1983	10	2415	36150	6.7	65	2415	36150	6.7
1983	11	1686	71675	2.4	65	1686	71675	2.4
1983	12	2088	155567	1.3	65	2088	155567	1.3
1984	1	1674	103431	1.6	65	1674	103431	1.6
1984	2	5700	46831	12.2	65	5700	46831	12.2
1984	3	6856	42147	16.3	30	6856	42147	16.3
1984	4	7542	23780	31.7	30	5231	23780	22.0
1984	5	5739	19566	29.3	30	4117	19566	21.0
1984	6	5950	17950	33.1	30	5328	17950	29.7
1984	7	9204	24061	38.3	35	8405	24061	34.9
1984	8	9265	21565	43.0	55	9265	21565	43.0
1984	9	5312	21367	24.9	55	5312	21367	24.9
1984	10	5456	18057	30.2	65	5456	18057	30.2
1984	11	7893	31819	24.8	65	7893	31819	24.8
1984	12	8407	39733	21.2	65	8407	39733	21.2
1985	1	5756	21381	26.9	65	5756	21381	26.9
1985	2	7517	22683	33.1	65	7517	22683	33.1
1985	3	8487	18008	47.1	30	5403	18008	30.0
1985	4	7194	15831	45.4	30	3690	15831	23.3
1985	5	5997	16028	37.4	30	3696	16028	23.1
1985	6	6300	15291	41.2	30	4588	15291	30.0
1985	7	9209	18751	49.1	35	6563	18751	35.0
1985	8	9884	16222	60.9	55	8831	16222	54.4
1985	9	8545	14352	59.5	55	7823	14352	54.5
1985	10	7518	12012	62.6	65	7355	12012	61.2
1985	11	7202	12681	56.8	65	7124	12681	56.2
1985	12	9751	19091	51.1	65	9458	19091	49.5

Month to Month Variation in Historical Exports
and Export/Inflow Ratios
With and Without Proposed Limits

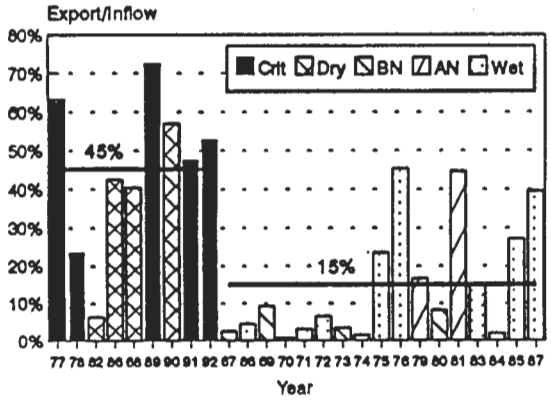
		Historical				Reoperated		
		Exports	Inflow	EXP/INF	Limit	Exports	Inflow	EXP/INF
Year	Mth	cfs	cfs	%	%	cfs	cfs	%
1986	1	8925	23316	38.3	65	8924	23316	38.3
1986	2	6002	207820	2.9	65	6002	207820	2.9
1986	3	3141	168596	1.9	30	3141	168596	1.9
1986	4	4612	50073	9.2	30	4611	50073	9.2
1986	5	6080	23530	25.8	30	5885	23530	25.0
1986	6	5954	19144	31.1	30	5403	19144	28.2
1986	7	8378	20306	41.3	35	7071	20306	34.8
1986	8	9727	18871	51.5	55	9620	18871	51.0
1986	9	10296	23021	44.7	55	10230	23021	44.4
1986	10	7432	20058	37.1	65	7432	20058	37.1
1986	11	6712	16284	41.2	65	6712	16284	41.2
1986	12	7112	17406	40.9	65	7112	17406	40.9
1987	1	6130	15985	38.3	65	6130	15985	38.3
1987	2	6737	20150	33.4	65	6737	20150	33.4
1987	3	5468	26322	20.8	30	4819	26322	18.3
1987	4	6837	15166	45.1	30	3473	15166	22.9
1987	5	5075	12595	40.3	30	2921	12595	23.2
1987	6	4940	12426	39.8	30	3728	12426	30.0
1987	7	8707	17133	50.8	35	5997	17133	35.0
1987	8	9560	16436	58.2	55	8894	16436	54.1
1987	9	8845	13492	65.6	55	7415	13492	55.0
1987	10	5726	11025	51.9	65	5726	11025	51.9
1987	11	5307	9815	54.1	65	5299	9815	54.0
1987	12	8860	17202	51.5	65	8326	17202	48.4
1988	1	10289	28789	35.7	65	10270	28789	35.7
1988	2	9895	13763	71.9	65	8588	13763	62.4
1988	3	8256	13880	59.5	30	4164	13880	30.0
1988	4	8364	19370	43.2	30	3898	19370	20.1
1988	5	6069	12991	46.7	30	2680	12991	20.6
1988	6	5690	12537	45.4	30	3759	12537	30.0
1988	7	7720	16238	47.5	35	5682	16238	35.0
1988	8	8539	15052	56.7	55	8037	15052	53.4
1988	9	7896	13141	60.1	55	7062	13141	53.7
1988	10	5435	10519	51.7	65	5297	10519	50.4
1988	11	5936	12739	46.6	65	5875	12739	46.1
1988	12	7036	13886	50.7	65	6914	13886	49.8
1989	1	10057	14236	70.6	65	8834	14236	62.1
1989	2	8064	13511	59.7	65	7943	13511	58.8
1989	3	10136	47293	21.4	30	9558	47293	20.2
1989	4	10302	23898	43.1	30	5021	23898	21.0
1989	5	6014	16138	37.3	30	3648	16138	22.6
1989	6	5043	15067	33.5	30	4245	15067	28.2
1989	7	9251	20223	45.7	35	7005	20223	34.6
1989	8	11056	19664	56.2	55	10262	19664	52.2
1989	9	10534	17981	58.6	55	9386	17981	52.2
1989	10	10351	15802	65.5	65	9569	15802	60.6
1989	11	10224	16503	62.0	65	10064	16503	61.0
1989	12	10297	16945	60.8	65	10173	16945	60.0
1990	1	10484	20356	51.5	65	10038	20356	49.3
1990	2	10405	15474	67.2	65	9678	15474	62.5
1990	3	10405	15136	68.7	30	4541	15136	30.0
1990	4	9465	16967	55.8	30	3202	16967	18.9
1990	5	3175	12000	26.5	30	2615	12000	21.8
1990	6	3276	11901	27.5	30	3066	11901	25.8

Month to Month Variation in Historical Exports
and Export/Inflow Ratios
With and Without Proposed Limits

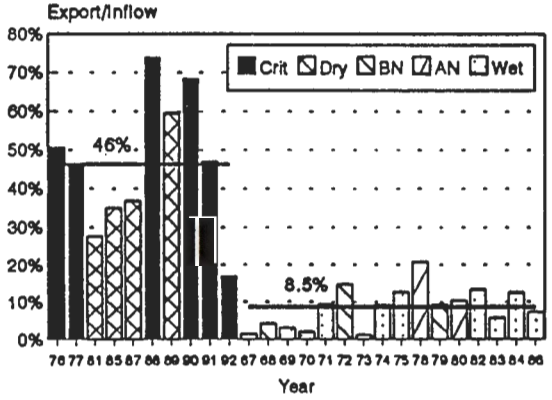
		Historical				Reoperated		
Year	Mth	Exports cfs	Inflow cfs	EXP/INF %	Limit %	Exports cfs	Inflow cfs	EXP/INF %
1990	7	6007	14712	40.8	35	5091	14712	34.6
1990	8	6446	15074	42.8	55	6446	15074	42.8
1990	9	5692	11105	51.3	55	5461	11105	49.2
1990	10	3364	8863	38.0	65	3364	8863	38.0
1990	11	3708	9065	40.9	65	3708	9065	40.9
1990	12	5057	11826	42.8	65	5057	11826	42.8
1991	1	4766	9894	48.2	65	4766	9894	48.2
1991	2	4384	8993	48.7	65	4326	8993	48.1
1991	3	9652	29652	32.6	30	7899	29652	26.6
1991	4	7399	12602	58.7	30	3170	12602	25.2
1991	5	2555	8895	28.7	30	1820	8895	20.5
1991	6	1770	9810	18.0	30	1763	9810	18.0
1991	7	2401	10332	23.2	35	2397	10332	23.2
1991	8	3650	10253	35.6	55	3623	10253	35.3
1991	9	4074	10751	37.9	55	4050	10751	37.7
1991	10	5153	10364	49.7	65	5115	10364	49.4
1991	11	3045	8387	36.3	65	3040	8387	36.2
1991	12	3045	10385	29.3	65	3045	10385	29.3
1992	1	6284	11640	54.0	65	6129	11640	52.7
1992	2	5993	30486	19.7	65	5993	30486	19.7
1992	3	10362	22891	45.3	30	6851	22891	29.9
1992	4	2905	11303	25.7	30	1979	11303	17.5
1992	5	1536	7609	20.2	30	1335	7609	17.5
1992	6	1753	9260	18.9	30	1695	9260	18.3
1992	7	1316	9000	14.6	35	1316	9000	14.6
1992	8	2469	9423	26.2	55	2469	9423	26.2
1992	9	4320	10600	40.8	55	4320	10600	40.8
1992	10	1709	7712	22.2	65	1709	7712	22.2
1992	11	2327	7593	0.0	65	2327	7593	0.0
1992	12	3960	13836	0.0	65	3957	13836	0.0

F:\DAYFLOW\SCHUSTER\DNSTEXP.MEM 10/31/94 16:17

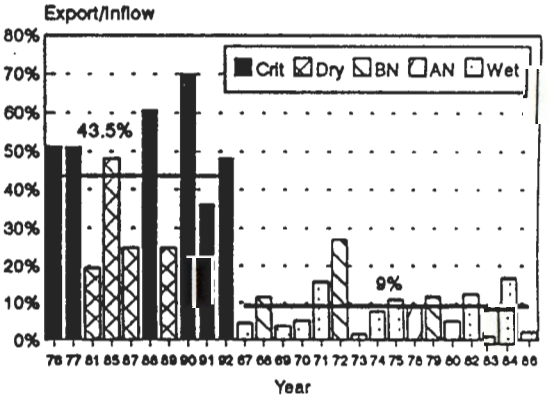
Historical Export/Inflow Ratio
January (1967-1992)



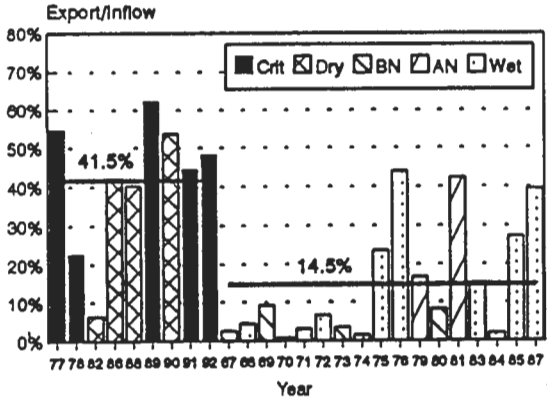
Historical Export/Inflow Ratio
February (1967-1992)



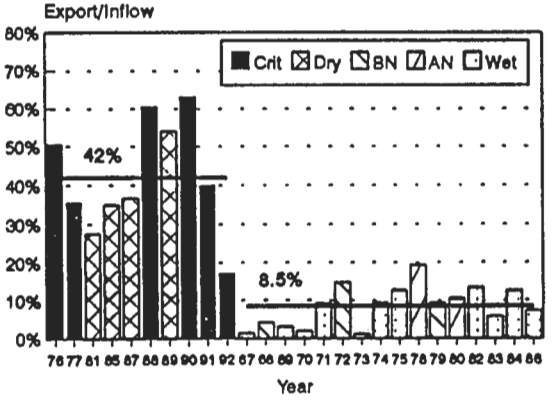
Historical Export/Inflow Ratio
March (1967-1992)



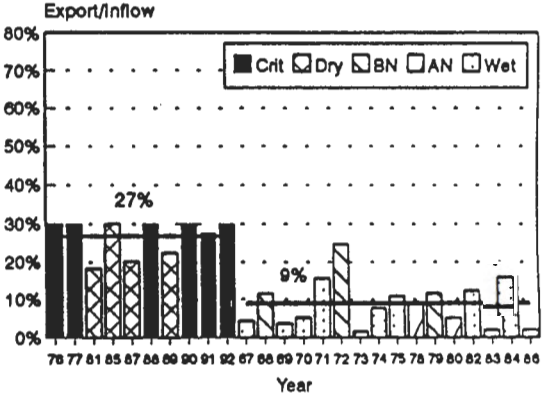
Export/Inflow Ratio with Water Users Proposal
January (1967-1992)



Export/Inflow Ratio with Water Users Proposal
February (1967-1992)

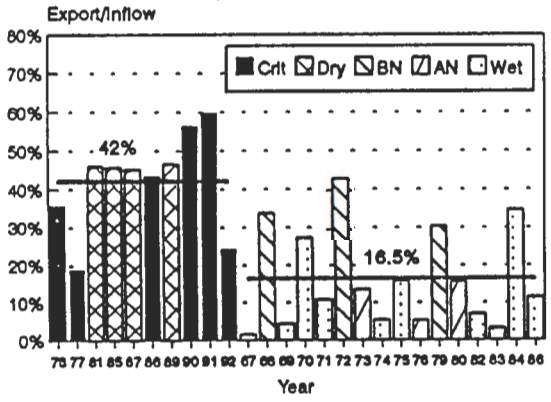


Export/Inflow Ratio with Water Users Proposal
March (1967-1992)

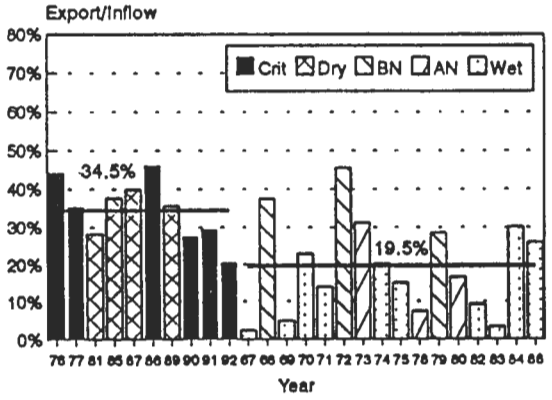


January, February and March Export/Inflow Ratios

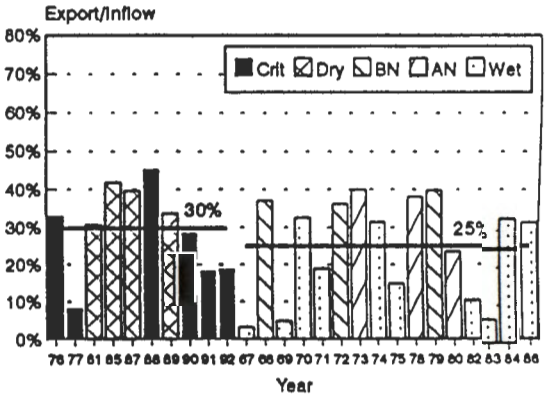
Historical Export/Inflow Ratio
April (1967-1992)



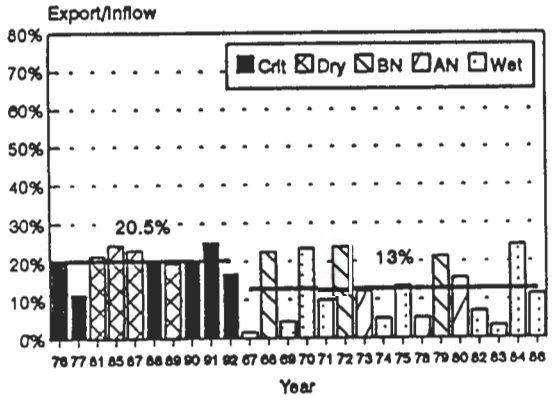
Historical Export/Inflow Ratio
May (1967-1992)



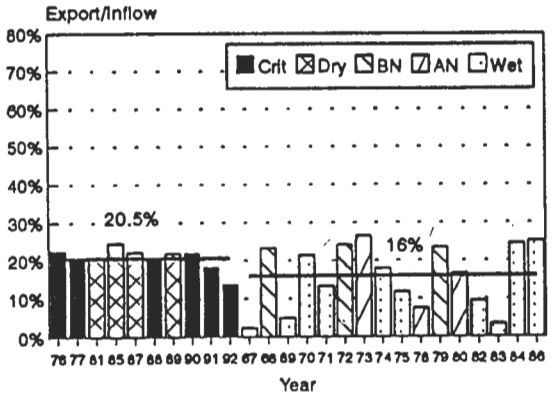
Historical Export/Inflow Ratio
June (1967-1992)



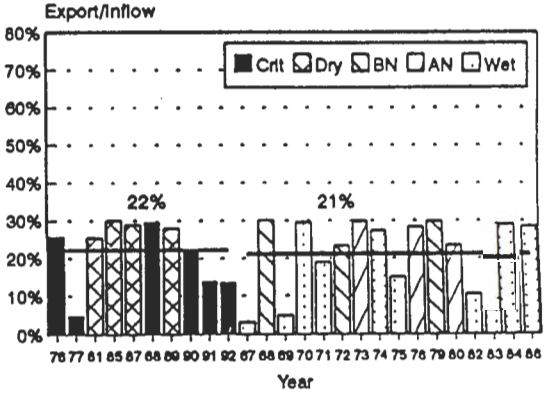
Export/Inflow Ratio with Water Users Proposal
April (1967-1992)



Export/Inflow Ratio with Water Users Proposal
May (1967-1992)

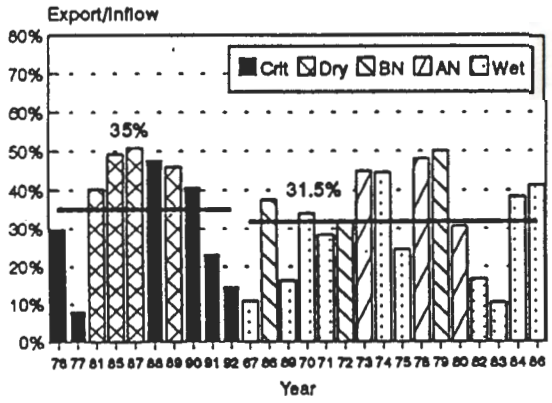


Export/Inflow Ratio with Water Users Proposal
June (1967-1992)

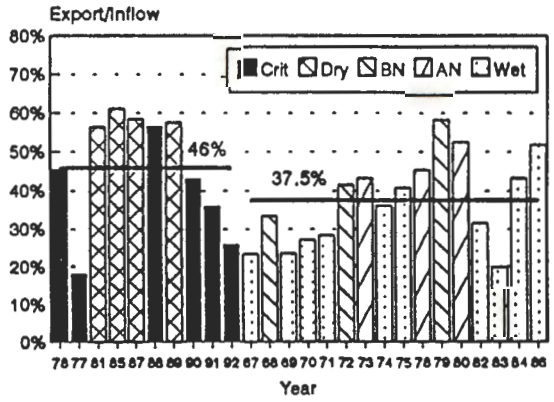


April, May and June Export/Inflow Ratios

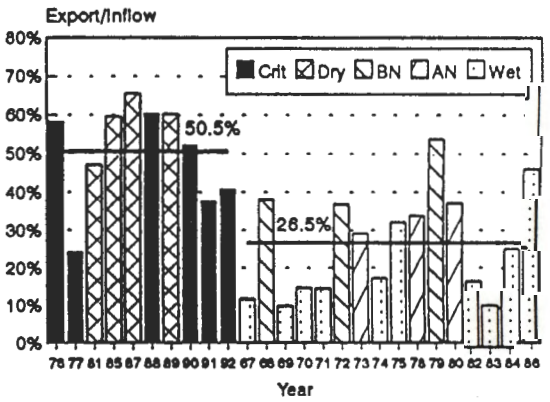
Historical Export/Inflow Ratio
July (1967-1992)



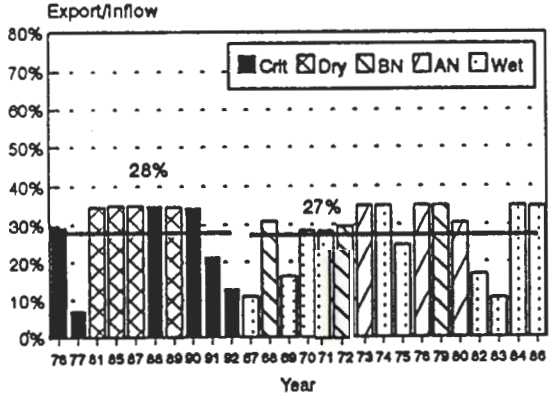
Historical Export/Inflow Ratio
August (1967-1992)



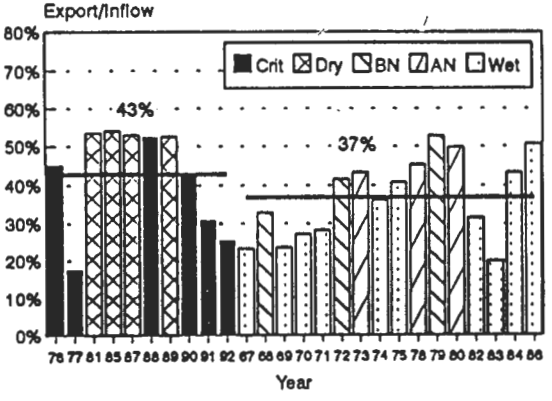
Historical Export/Inflow Ratio
September (1967-1992)



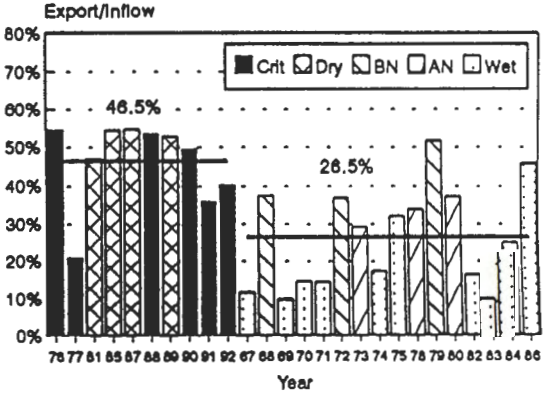
Export/Inflow Ratio with Water Users Proposal
July (1967-1992)



Export/Inflow Ratio with Water Users Proposal
August (1967-1992)

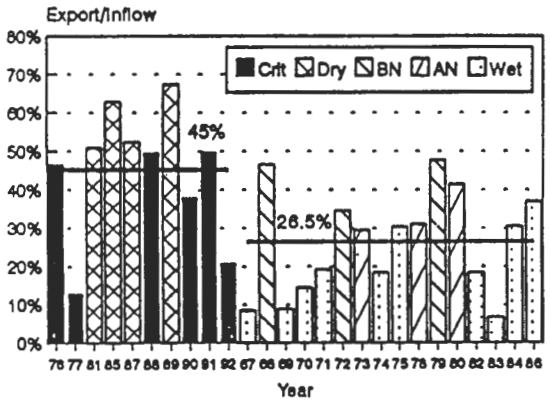


Export/Inflow Ratio with Water Users Proposal
September (1967-1992)

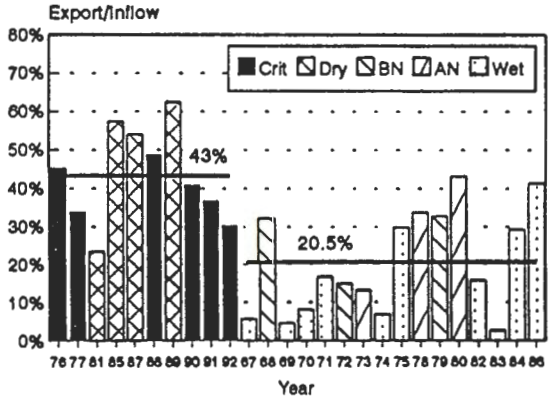


July, August and September Export/Inflow Ratios

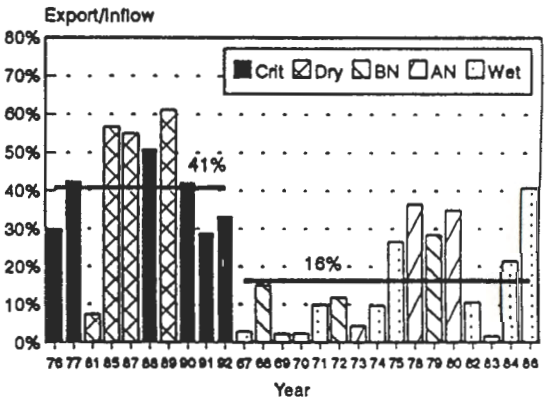
Historical Export/Inflow Ratio
October (1967-1992)



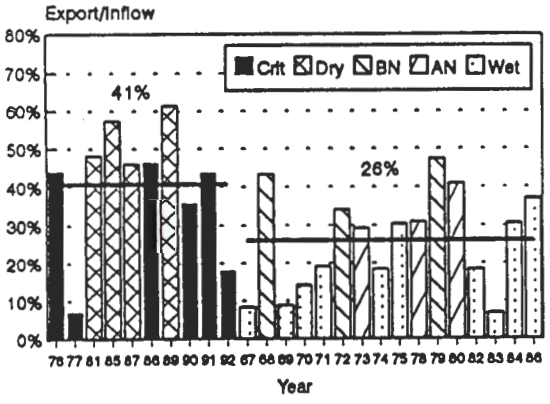
Historical Export/Inflow Ratio
November (1967-1992)



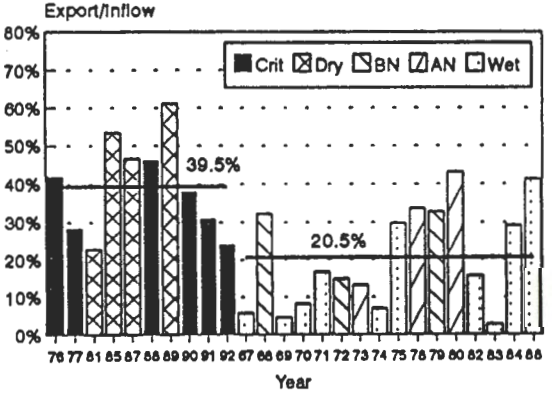
Historical Export/Inflow Ratio
December (1967-1992)



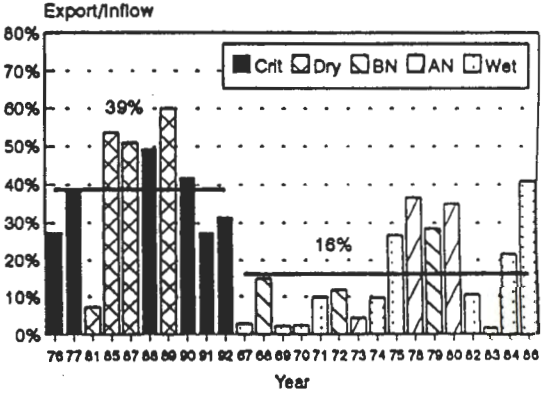
Export/Inflow Ratio with Water Users Proposal
October (1967-1992)



Export/Inflow Ratio with Water Users Proposal
November (1967-1992)

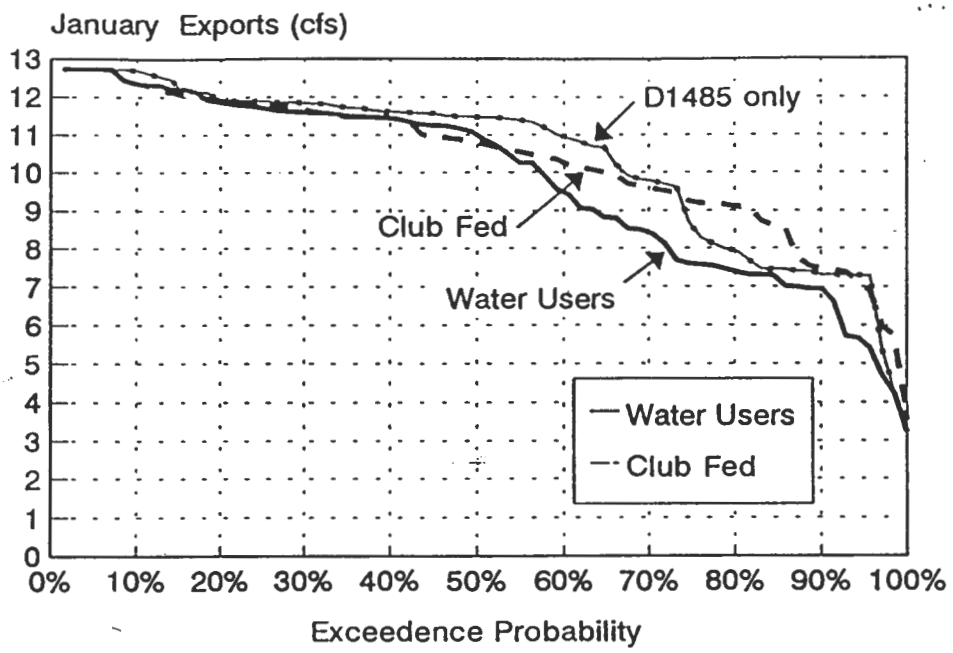


Export/Inflow Ratio with Water Users Proposal
December (1967-1992)

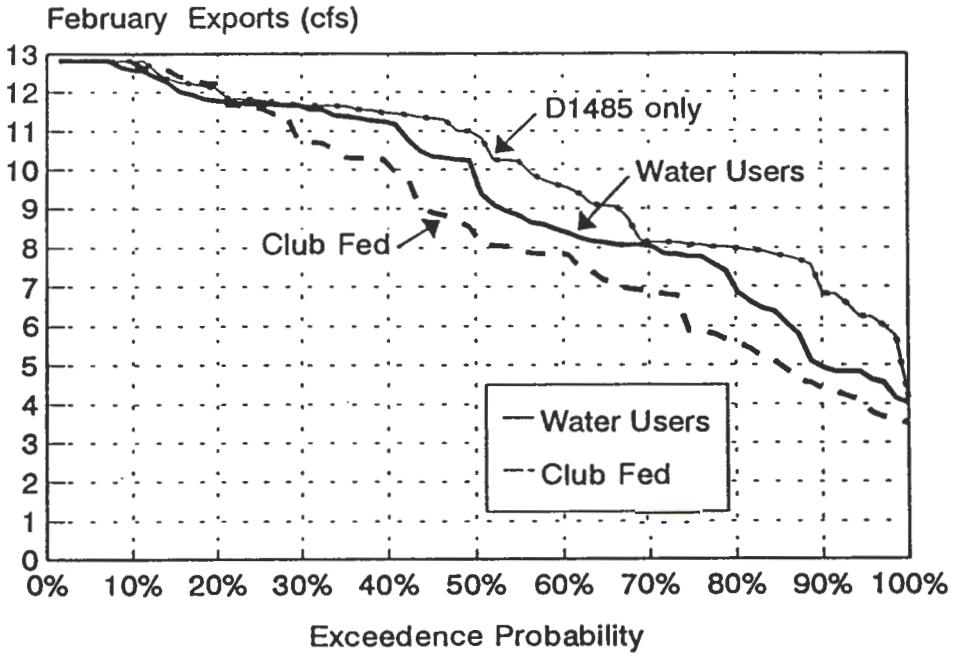


October, November and December Export/Inflow Ratios

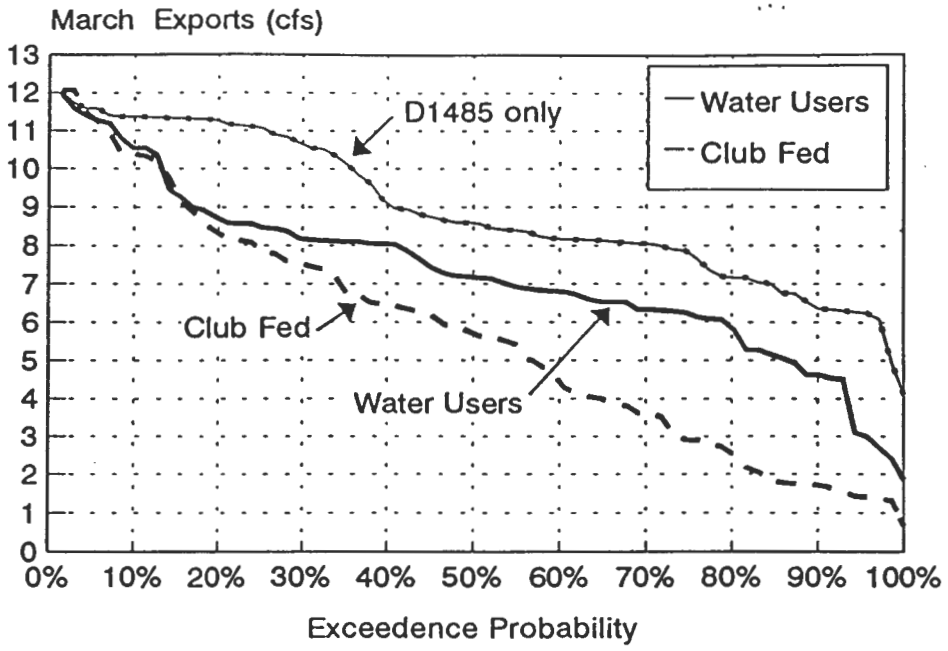
January Tracy and Banks Exports
DWRSIM Output 1922-1992



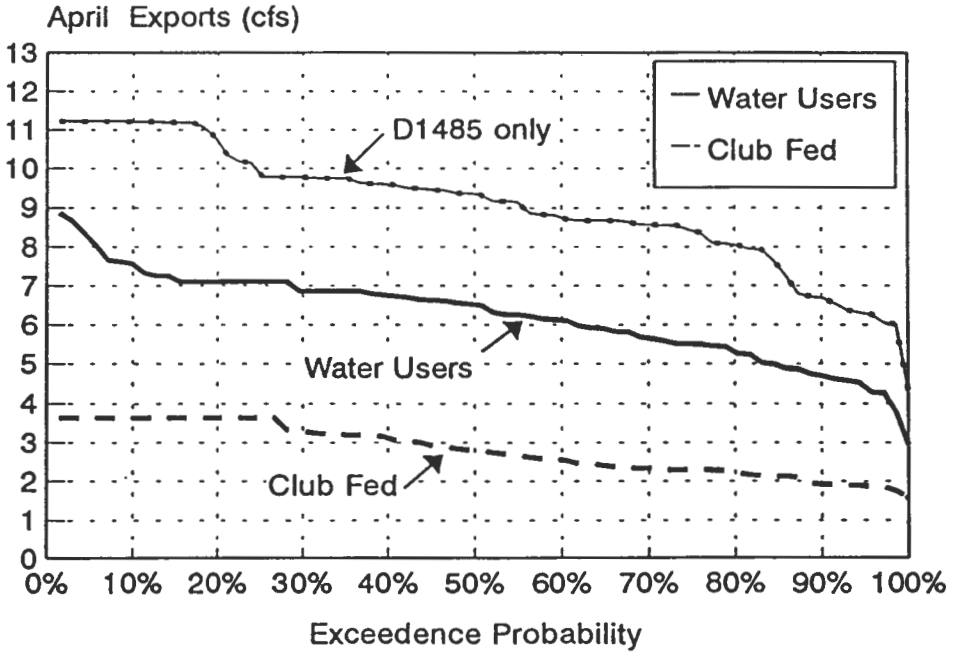
February Tracy and Banks Exports
DWRSIM Output 1922-1992



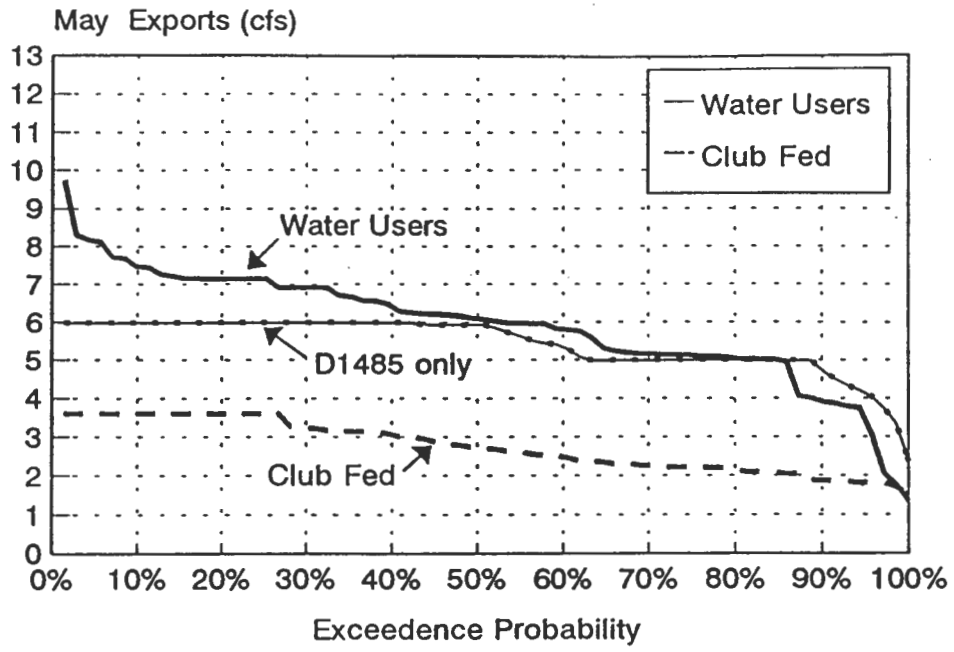
March Tracy and Banks Exports
DWRSIM Output 1922-1992



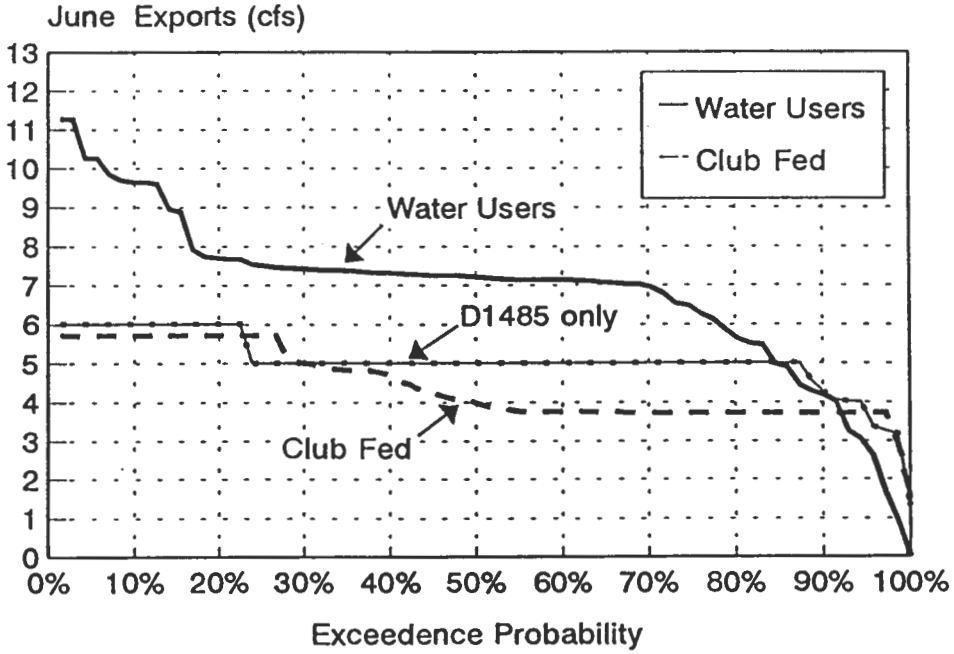
April Tracy and Banks Exports
DWRSIM Output 1922-1992



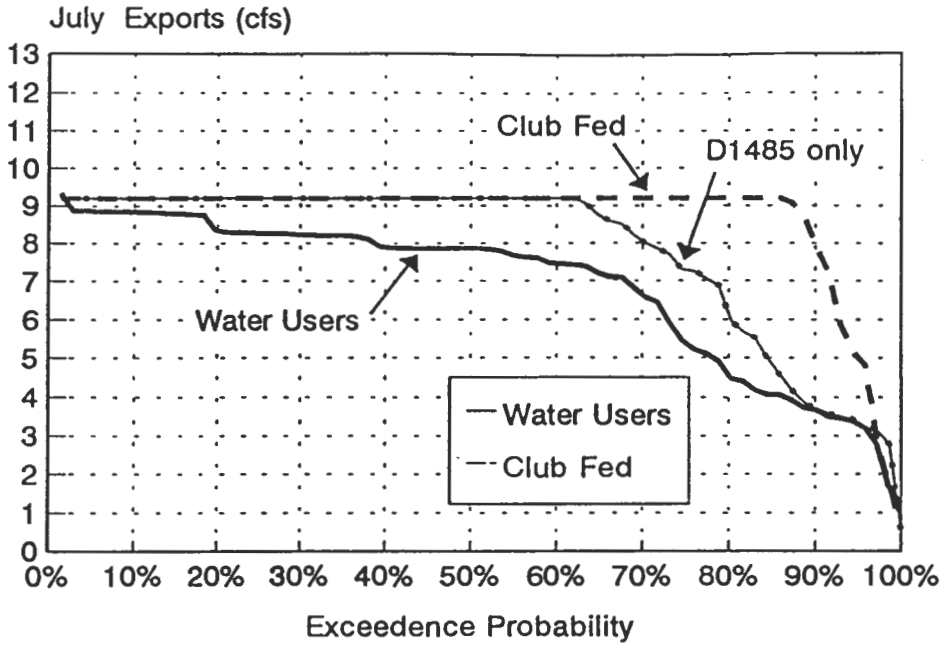
May Tracy and Banks Exports
DWRSIM Output 1922-1992



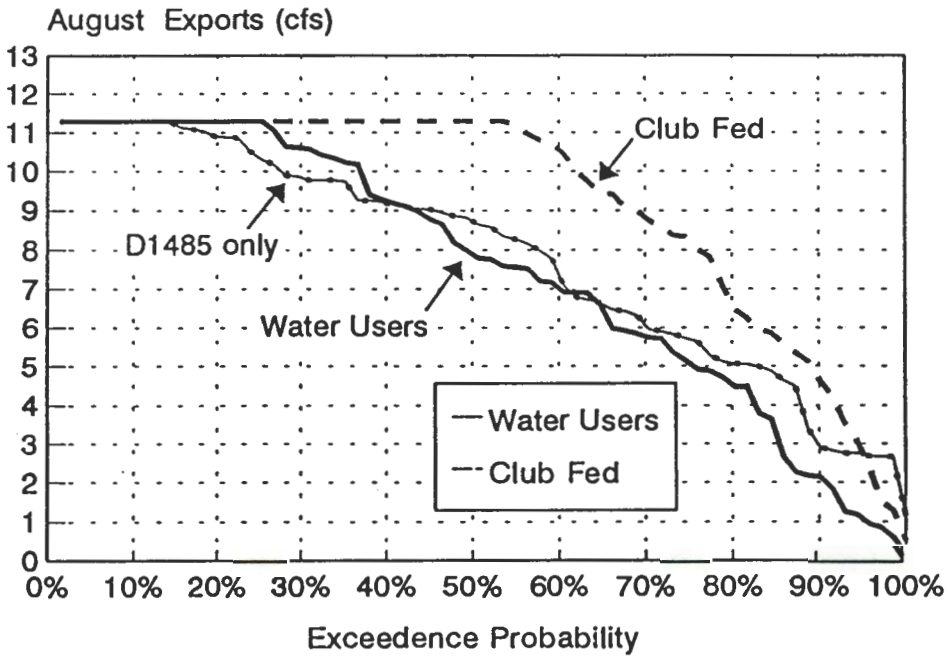
June Tracy and Banks Exports
DWRSIM Output 1922-1992



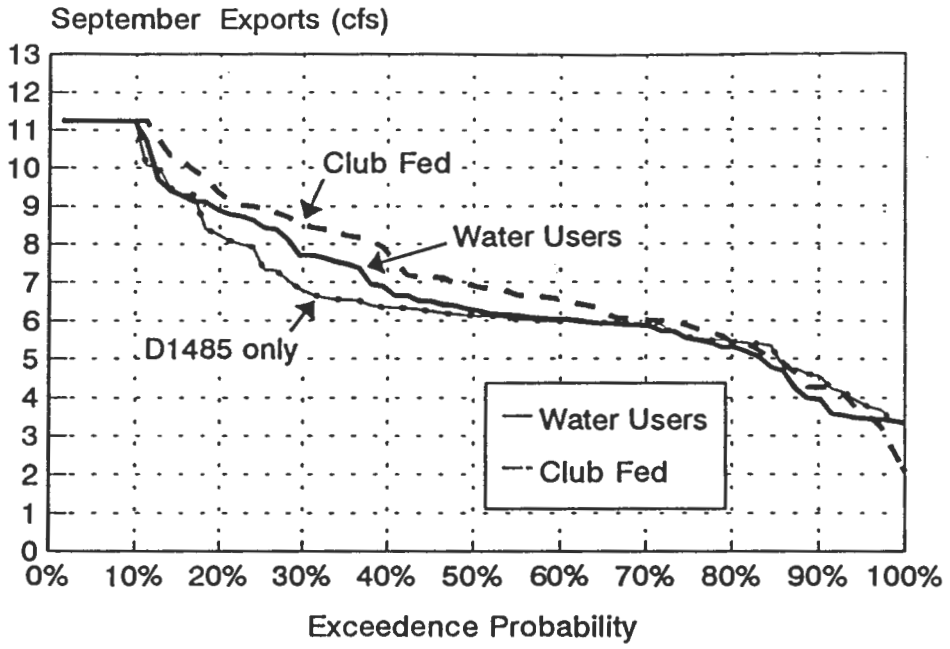
July Tracy and Banks Exports
DWRSIM Output 1922-1992



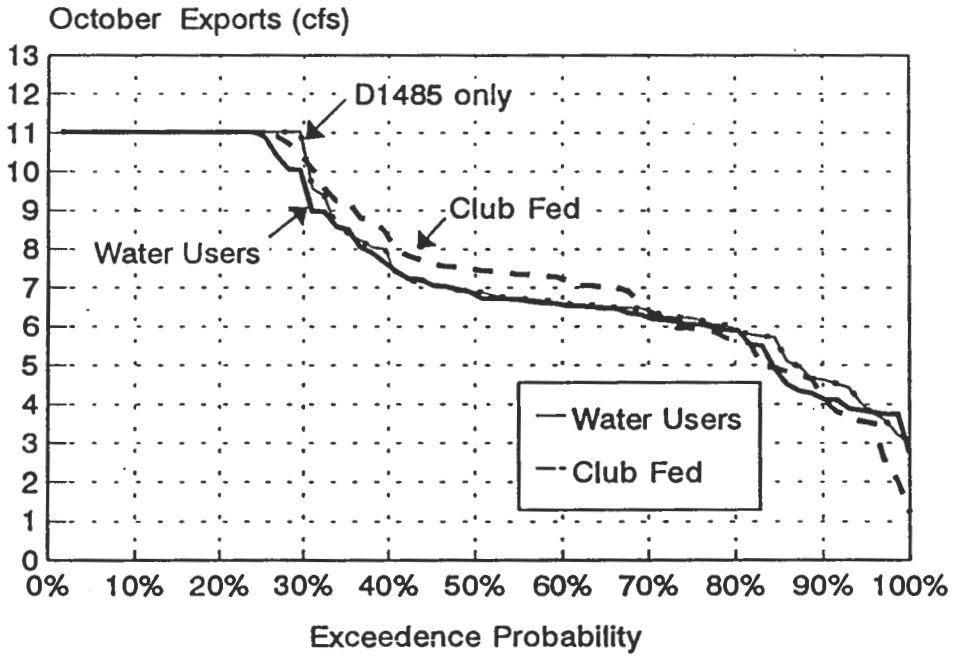
August Tracy and Banks Exports
DWRSIM Output 1922-1992



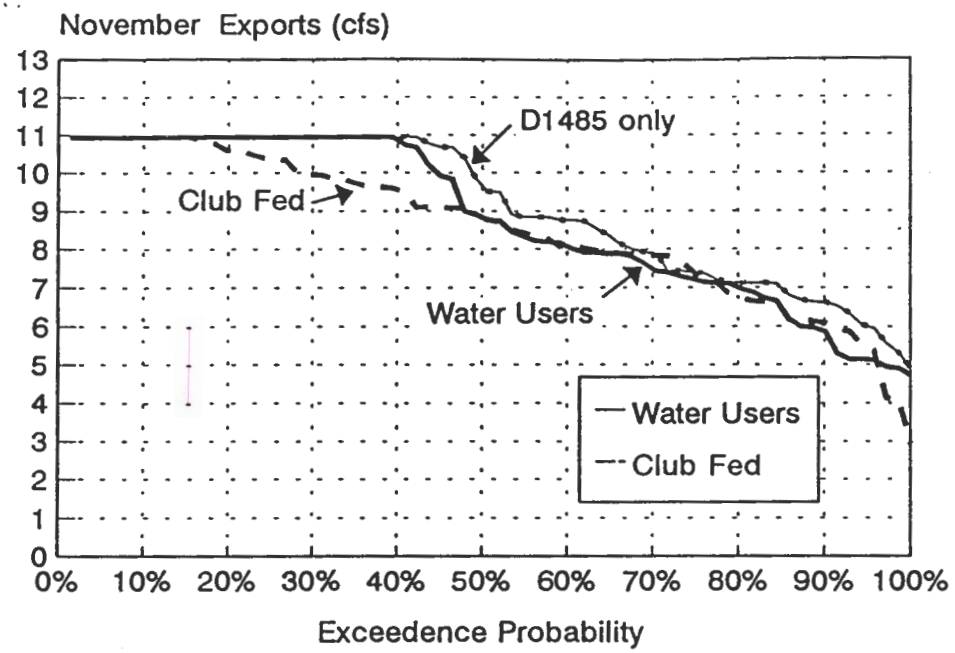
September Tracy and Banks Exports
DWRSIM Output 1922-1992



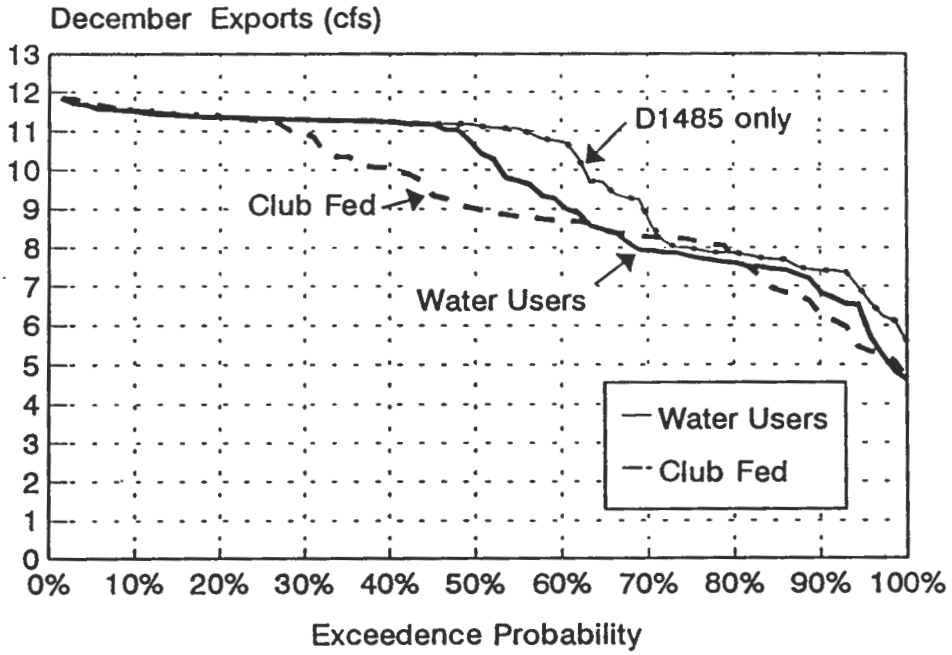
October Tracy and Banks Exports
DWRSIM Output 1922-1992



November Tracy and Banks Exports
DWRSIM Output 1922-1992



December Tracy and Banks Exports
DWRSIM Output 1922-1992



Tracy and Banks Export Pumping (cfs)
DWRSIM Output 1922-1992

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
21	10	4954	6181	5035	6173
22	10	11027	11027	11027	11027
23	10	7523	5903	8590	7362
24	10	4834	6540	4824	5088
25	10	7304	6707	7739	6713
26	10	7012	6469	7391	6465
27	10	7997	7044	8020	6896
28	10	7428	5544	7921	6808
29	10	4647	5500	4728	4524
30	10	5707	4328	6894	6228
31	10	2029	4116	2483	3066
32	10	4950	4108	6106	4042
33	10	2474	3843	2965	3195
34	10	3804	3778	4063	4423
35	10	7830	7224	7983	7030
36	10	5914	6348	6247	6060
37	10	5872	6601	5835	6766
38	10	11027	11027	11027	11027
39	10	7062	5903	7580	5747
40	10	7566	6317	6229	6728
41	10	10928	11027	11027	11027
42	10	11027	11027	11027	11027
43	10	7350	8507	7708	8247
44	10	7001	6648	7636	6529
45	10	8819	8051	8822	8405
46	10	7720	6957	7949	6950
47	10	7621	7433	8021	7157
48	10	9574	7238	8049	7180
49	10	7401	6718	7787	6686
50	10	9256	8970	8966	8588
51	10	7345	6731	7767	6417
52	10	11027	10055	11027	11027
53	10	11027	11027	11027	11027
54	10	7540	6906	7936	6904
55	10	6926	6534	7354	6591
56	10	11027	11027	11027	11027
57	10	11027	11027	11027	11027
58	10	11027	11027	11027	11027
59	10	5959	6463	6360	6506
60	10	4743	6061	4924	6259
61	10	6254	5968	7120	5886
62	10	11027	11027	11027	11027
63	10	10731	10419	11027	9382
64	10	6299	6121	6746	6045
65	10	10448	7909	10426	11027
66	10	7187	6521	7566	6583
67	10	11027	10072	11027	11027
68	10	7299	6722	7697	6638
69	10	11027	11027	11027	11027
70	10	7452	6611	7654	6567
71	10	11027	11027	11027	11027
72	10	8497	8590	8856	8022
73	10	9231	8992	8934	8053
74	10	11027	11027	11027	11027
75	10	11027	11027	11027	11027
76	10	3560	4904	4719	4967
77	10	1230	3733	3630	3573
78	10	11027	11027	11027	11027
79	10	8731	7671	10302	9573
80	10	11027	11027	11027	11027
81	10	6629	6058	6985	5800
82	10	11027	11027	11027	11027
83	10	7062	7062	7062	7062
84	10	11027	11027	11027	11027
85	10	5659	6179	6128	6249
86	10	10091	10893	11027	11027
87	10	4082	4276	4553	4651
88	10	3693	2757	4700	5736
89	10	5960	4517	6536	6496
90	10	5554	3735	5746	4629
91	10	3504	3891	3680	3741

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
21	11	8303	7126	8303	7126
22	11	10941	10941	10941	10941
23	11	7921	7636	8615	7443
24	11	6736	7153	7188	7374
25	11	7882	7114	8564	7140
26	11	10589	10941	10941	10941
27	11	10941	10941	8839	10941
28	11	8702	9001	9888	8761
29	11	5858	5972	6429	7110
30	11	7126	6886	7446	7889
31	11	5963	5987	4552	6535
32	11	6089	5871	6306	5564
33	11	6175	5126	5846	7236
34	11	7895	7909	8431	8765
35	11	7834	7229	8324	7147
36	11	6647	6978	6824	6647
37	11	8260	10941	8374	10941
38	11	9961	10745	10941	10941
39	11	6144	6663	6590	6695
40	11	4131	8163	8525	7921
41	11	10594	10941	10941	10941
42	11	10941	10941	10941	10941
43	11	7978	10941	10207	9827
44	11	10505	10941	10941	10941
45	11	10772	10941	10941	10941
46	11	9063	8763	9936	8848
47	11	8058	8007	9101	8145
48	11	8514	7820	9701	9513
49	11	8034	7423	8572	7382
50	11	10941	10941	10941	10941
51	11	9729	10941	10604	10941
52	11	9819	7887	9865	9504
53	11	10844	10941	10941	10941
54	11	9085	9934	10092	10780
55	11	7697	8458	9045	8557
56	11	9111	10941	10657	10941
57	11	10345	10941	10941	10941
58	11	9503	8195	10941	10941
59	11	6642	7293	7194	6040
60	11	8061	8733	9511	8837
61	11	7821	7392	8324	8016
62	11	9647	10941	10941	10941
63	11	9111	10941	9335	10941
64	11	8770	10221	9876	10403
65	11	10941	10941	10223	10941
66	11	8880	10669	9713	10686
67	11	9593	7920	8727	8733
68	11	8448	8900	9781	8904
69	11	10941	7887	10681	10684
70	11	10941	10941	10941	10941
71	11	9093	10941	10392	10941
72	11	10941	10941	10941	10941
73	11	10941	10941	10941	10941
74	11	10017	10941	10941	10941
75	11	10368	10941	10941	10941
76	11	5364	6199	6989	7126
77	11	2952	4952	5107	5326
78	11	9658	10941	10914	10941
79	11	9943	10941	10941	10941
80	11	10406	10941	10941	10941
81	11	9847	10941	9428	10941
82	11	10941	9844	10941	10941
83	11	6630	5299	6630	6630
84	11	10941	10941	10941	10941
85	11	7837	8217	8617	8383
86	11	7452	8327	9861	8839
87	11	5527	6740	5884	5950
88	11	7136	5152	8059	7438
89	11	6148	5149	6440	6808
90	11	6868	4733	7239	6333
91	11	4092	4910	4484	4921

Tracy and Banks Export Pumping (cfs)
DWRSIM Output 1922-1992

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
21	12	11472	11472	11472	11472
22	12	11678	11678	11678	11678
23	12	8446	8398	9816	7802
24	12	8669	8888	9604	9379
25	12	6942	7603	7600	7855
26	12	9042	11180	9989	11197
27	12	10112	11363	11376	11423
28	12	8708	9633	9384	9710
29	12	8375	10291	9696	10709
30	12	5075	6537	6067	7356
31	12	11002	11235	11235	11235
32	12	5308	5712	6352	6115
33	12	8298	8991	9813	10311
34	12	8079	8567	8912	9284
35	12	7491	7871	9447	7871
36	12	8897	8144	10354	8177
37	12	11351	11351	11351	11604
38	12	9896	7734	9261	9262
39	12	6794	7503	7332	7503
40	12	11453	11566	11420	11566
41	12	11630	8470	11077	11083
42	12	10438	11323	11067	11294
43	12	8268	7937	9152	7938
44	12	11420	11432	11432	11432
45	12	11521	11534	11616	11777
46	12	10080	11418	11295	11476
47	12	7245	6824	7686	8004
48	12	8261	9278	9343	9714
49	12	6632	7205	7243	7698
50	12	11853	11853	11853	11853
51	12	11304	11317	11317	11317
52	12	10342	7687	7687	7688
53	12	8809	11285	10314	11285
54	12	8852	11266	8895	11266
55	12	11292	11301	11301	11301
56	12	8057	7502	7883	7403
57	12	8743	11385	8818	11385
58	12	8369	7792	8239	8573
59	12	6841	7627	8852	10939
60	12	8239	11041	9423	11178
61	12	8778	11180	9672	11181
62	12	8613	11266	8428	11266
63	12	9101	11034	10288	11072
64	12	11308	11308	11308	11308
65	12	11556	11569	11556	11668
66	12	11526	11526	11539	11539
67	12	9734	7310	7734	7734
68	12	11249	11249	11249	11249
69	12	9348	7427	7427	7427
70	12	11411	11411	11411	11411
71	12	10851	11276	11276	11276
72	12	8970	11263	8995	11263
73	12	11352	11365	11365	11574
74	12	10347	10761	10761	10761
75	12	8690	10421	10344	11310
76	12	5455	9815	8701	8009
77	12	8218	9327	9680	11192
78	12	7665	6545	7357	6582
79	12	11023	11345	11345	11345
80	12	9973	9734	11541	11541
81	12	11217	11217	11217	11217
82	12	11853	7936	11075	11076
83	12	6240	5242	6234	6234
84	12	11708	11708	11708	11121
85	12	10056	11332	11332	11332
86	12	8140	7877	8144	7877
87	12	9271	11175	10577	11190
88	12	6128	6695	6822	7405
89	12	5326	7442	6456	10798
90	12	4653	4627	5185	5578
91	12	5953	4822	6378	6982

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	1	12146	12146	12146	12146
23	1	10554	9924	11338	9820
24	1	10581	8532	10356	11582
25	1	7155	6953	5879	7990
26	1	11404	11483	11339	11491
27	1	10204	11346	9772	11392
28	1	9195	11774	9220	11901
29	1	10075	9064	10502	10694
30	1	8729	11467	8729	11467
31	1	9519	9047	10220	10213
32	1	11466	11466	11466	11466
33	1	10761	10261	10056	11619
34	1	11508	11508	11508	11508
35	1	10886	11763	11053	11763
36	1	11863	11863	11863	11863
37	1	11950	11098	11958	11958
38	1	12292	12351	12351	12729
39	1	9457	6620	7403	7403
40	1	11706	11706	11706	11706
41	1	12450	12729	12450	12729
42	1	8542	7318	7318	7318
43	1	11002	7457	8436	7458
44	1	11468	10906	10649	11845
45	1	12121	10741	12129	12129
46	1	11968	12317	12361	12151
47	1	10480	10264	11234	9919
48	1	10016	10516	10033	11193
49	1	10127	7575	8035	11487
50	1	9570	11566	9534	11566
51	1	12729	11554	12729	12729
52	1	12729	12729	12729	12729
53	1	7451	5667	7292	7292
54	1	9103	8383	9443	9689
55	1	10921	11644	10945	11644
56	1	12729	12729	12729	12729
57	1	10957	9565	10940	11888
58	1	11810	11818	11818	11818
59	1	11471	7377	7461	7462
60	1	9188	8830	8233	9777
61	1	10404	8800	8599	10673
62	1	7757	7019	6667	8280
63	1	11463	9425	11463	11007
64	1	9656	11602	9670	11606
65	1	12729	12729	12729	12729
66	1	11765	12216	11765	12460
67	1	11916	11916	11924	11924
68	1	7446	4239	7318	7318
69	1	12373	12452	12373	12635
70	1	7377	4699	7292	7292
71	1	11618	11618	11618	11825
72	1	11337	11182	11617	11715
73	1	11573	11581	11581	11581
74	1	12043	12213	12052	12702
75	1	10685	7693	7693	7693
76	1	9159	6944	9227	7923
77	1	5716	8128	5058	5362
78	1	11873	7302	11873	11873
79	1	11764	11238	11805	11900
80	1	12729	12721	12368	10819
81	1	9924	7318	8467	7401
82	1	12015	12322	12336	12536
83	1	9707	7004	7297	7297
84	1	5988	3218	3514	3514
85	1	9246	7540	9032	7458
86	1	9082	11419	8989	11419
87	1	10360	8492	9672	9614
88	1	8592	11273	8788	11336
89	1	7547	7595	6989	8707
90	1	10797	11255	10523	10913
91	1	3563	5415	3908	4244
92	1	6903	5713	8082	8126

Tracy and Banks Export Pumping (cfs)
DWRSIM Output 1922-1992

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	2	12821	12821	12821	12821
23	2	4367	4011	8145	8140
24	2	5104	9372	5061	11664
25	2	11664	11664	11664	11664
26	2	10718	11693	10383	11701
27	2	12231	10789	12231	12231
28	2	8058	10341	9253	10248
29	2	5830	10246	5853	11833
30	2	5808	11552	5824	11647
31	2	5651	7405	5343	9534
32	2	10767	10265	11026	12123
33	2	4597	6447	4993	9377
34	2	6813	10312	7157	11860
35	2	5545	6619	5546	7691
36	2	12821	12821	12821	12821
37	2	12821	12821	12821	12821
38	2	12787	8927	12220	8077
39	2	6943	5117	7139	7926
40	2	11403	11403	11667	11476
41	2	12821	12821	12821	12821
42	2	7831	7774	7774	7774
43	2	8085	8023	8085	8024
44	2	10689	12540	11346	12540
45	2	12370	12020	12821	10252
46	2	7159	6856	8145	8140
47	2	6855	11952	7475	12153
48	2	4206	8083	4413	11541
49	2	5188	8583	5277	11648
50	2	9947	11760	9948	11760
51	2	9078	7843	10597	11422
52	2	12599	12663	12821	12821
53	2	7838	4822	6558	6558
54	2	11441	8140	10562	8140
55	2	5420	10479	5535	11328
56	2	11673	12584	12556	12821
57	2	9765	11377	10750	10218
58	2	12643	9092	12651	11354
59	2	8046	6076	7985	7920
60	2	8526	11792	8523	11792
61	2	7503	11685	6545	11685
62	2	12255	12255	12255	12255
63	2	10528	7590	11883	7985
64	2	4547	8373	4565	9901
65	2	8816	11705	10809	12369
66	2	8893	11712	9644	8746
67	2	12821	11250	12821	11289
68	2	7930	4835	6000	6000
69	2	11632	11271	11460	10998
70	2	7834	4822	6246	6238
71	2	7099	8639	8043	10816
72	2	6762	8473	7457	9062
73	2	12400	12400	12821	12821
74	2	10302	8821	11881	9051
75	2	10313	8262	8262	8197
76	2	4310	11173	4643	9737
77	2	3653	5800	3563	6813
78	2	11568	4549	8797	6826
79	2	8700	7836	10863	9117
80	2	10270	8081	8081	8081
81	2	7867	7774	7836	7831
82	2	12580	11664	12821	11453
83	2	7398	4628	6246	6247
84	2	4879	4144	4144	4145
85	2	6917	8081	7659	8024
86	2	12821	12821	12821	12821
87	2	5873	11555	5961	11555
88	2	3493	8176	3335	11001
89	2	3783	4926	3757	7578
90	2	4093	11337	3775	9620
91	2	3599	6378	3376	5741
92	2	10272	11827	10271	11827

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	3	10391	10542	10548	10551
23	3	2175	6880	5063	7898
24	3	1349	2408	2908	10135
25	3	2904	6140	5533	11169
26	3	1824	6604	4137	11362
27	3	6518	8373	9461	8956
28	3	11485	8446	11811	8596
29	3	2056	3110	4067	10525
30	3	5777	9008	7915	11285
31	3	1742	2690	3370	4096
32	3	1554	1858	3695	8666
33	3	1752	5164	3982	11132
34	3	1633	4512	3647	8157
35	3	7559	8737	9711	11733
36	3	6483	10542	9185	11586
37	3	12064	11964	12064	12038
38	3	7394	7195	7394	7169
39	3	2716	4542	4773	7018
40	3	10352	11591	11423	11591
41	3	12064	11200	11422	11107
42	3	5958	7168	7168	7168
43	3	8146	7213	8146	7200
44	3	4296	7670	6641	9204
45	3	6360	8107	8689	8420
46	3	4053	7152	6821	8060
47	3	3829	6844	5957	11354
48	3	3078	7040	5217	11328
49	3	9798	11276	11406	11371
50	3	3522	6824	5987	11401
51	3	6729	8159	7645	8398
52	3	10159	6940	10392	8939
53	3	3891	6543	6479	6761
54	3	7824	7868	8743	8142
55	3	1734	5800	4231	10689
56	3	5879	8188	8573	8811
57	3	8101	8048	10605	8167
58	3	8884	8055	11668	8055
59	3	2534	6724	4537	7035
60	3	3627	6802	5755	10832
61	3	2843	6336	4561	11304
62	3	4136	8064	6323	11056
63	3	5529	8570	8427	8571
64	3	1428	5282	3953	8166
65	3	2906	7443	5673	9628
66	3	3998	8132	6023	8196
67	3	7602	6290	8278	6352
68	3	6277	6543	6543	6544
69	3	6424	6314	6487	6315
70	3	7794	6543	6761	6761
71	3	8180	10794	10729	8743
72	3	5054	8566	7189	8236
73	3	10948	8904	11252	10365
74	3	11237	8596	10233	8596
75	3	8557	8141	7964	7645
76	3	1781	5060	3909	8110
77	3	659	2992	3054	6246
78	3	5634	5280	5800	6284
79	3	8361	8114	8361	8361
80	3	6761	6096	6096	6096
81	3	7465	7305	8251	7370
82	3	9123	8459	9877	8459
83	3	5601	4948	4948	4949
84	3	6198	6341	6341	6342
85	3	4684	6068	6865	7994
86	3	10397	10364	10546	10885
87	3	4876	9461	7591	9856
88	3	1317	4638	2829	7868
89	3	7265	11402	9367	11298
90	3	1409	4626	3308	8090
91	3	5421	9262	7549	11351
92	3	3607	6248	5646	11327

Tracy and Banks Export Pumping (cfs)
DWRSIM Output 1922-1992

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	4	3640	7340	9172	9172
23	4	3190	7120	8568	9365
24	4	1851	4584	3627	9764
25	4	2744	6870	8157	11214
26	4	2344	6618	7396	11226
27	4	3196	7120	11013	9172
28	4	2532	6870	8040	9586
29	4	2133	4536	4011	10152
30	4	2208	5514	4460	11197
31	4	1745	4264	3587	6017
32	4	3019	5976	5620	7927
33	4	2343	4700	4037	6551
34	4	1861	5262	3681	6373
35	4	3194	7664	11226	11226
36	4	3326	7120	7550	11226
37	4	3640	7120	9379	10794
38	4	3640	6762	6762	6688
39	4	2296	5648	4106	8557
40	4	3056	7120	10393	11226
41	4	3640	8042	8065	8043
42	4	3640	7260	8570	8570
43	4	3640	7629	8550	8551
44	4	2626	5238	5213	8814
45	4	3218	6224	6288	8831
46	4	3014	6254	6490	9363
47	4	2288	5902	4628	10348
48	4	2578	6870	8017	11214
49	4	2460	5500	5397	11197
50	4	2690	6538	6780	11226
51	4	2894	5924	6422	9754
52	4	3640	7257	7258	7258
53	4	2814	6650	6558	8707
54	4	2595	6870	9602	9785
55	4	2344	4612	4790	11074
56	4	3640	7120	8624	9454
57	4	2801	6870	5741	9754
58	4	3640	8859	8859	8860
59	4	2300	5028	4290	8676
60	4	2128	5824	4721	11214
61	4	1899	5446	4057	10181
62	4	2848	6158	5800	11197
63	4	3206	7120	11226	9639
64	4	2290	4990	4416	9497
65	4	3640	7120	11226	9785
66	4	2448	5682	5642	9609
67	4	3640	7582	7644	7644
68	4	2302	5594	5009	8676
69	4	3640	6727	6727	6728
70	4	2926	6128	6088	8676
71	4	2714	6870	6645	9785
72	4	2276	5456	5134	9754
73	4	3150	6504	6932	9609
74	4	3640	7120	9492	9492
75	4	3640	7120	9661	9785
76	4	1923	4870	3771	8442
77	4	1571	2950	3665	4341
78	4	3640	6313	6313	6313
79	4	3274	6700	6816	8645
80	4	3640	6262	6262	6263
81	4	2412	6098	4634	8678
82	4	3640	8356	8373	8357
83	4	3640	6796	6796	6796
84	4	3289	6560	7874	8570
85	4	2394	4884	4721	9330
86	4	3640	8669	10071	9453
87	4	2132	5820	3714	9149
88	4	1947	4754	4026	8080
89	4	2182	6634	5839	11226
90	4	1897	5518	3841	6053
91	4	2109	3791	4342	8098
92	4	1918	4278	4114	7944

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	5	3603	7461	5984	5984
23	5	3138	6030	5936	5926
24	5	1807	3864	4992	3730
25	5	2678	5762	5984	5984
26	5	2265	6106	4992	4992
27	5	3144	7146	5984	5984
28	5	2459	6912	4992	5926
29	5	2099	3903	4992	4336
30	5	2124	5123	4992	4992
31	5	1698	1760	1712	4707
32	5	3014	5233	4777	3345
33	5	2314	3050	5679	4992
34	5	1817	2057	4992	4505
35	5	3143	7146	5912	5984
36	5	3278	5954	5113	5434
37	5	3603	5976	5840	5840
38	5	3603	8128	5984	5984
39	5	2214	5098	4992	4992
40	5	3000	7229	5984	5984
41	5	3603	7476	5984	5984
42	5	3603	7146	5984	5984
43	5	3603	7164	5439	5732
44	5	2556	5020	5912	5928
45	5	3167	5578	5924	5927
46	5	2956	6226	4992	4992
47	5	2206	5132	4992	4992
48	5	2506	6912	5984	5984
49	5	2386	6197	5984	5984
50	5	2623	6254	5984	5984
51	5	2834	6568	5984	5984
52	5	3603	8302	5984	5984
53	5	2748	6912	5984	5984
54	5	2524	6912	4992	5286
55	5	2265	4952	5984	5984
56	5	3603	7723	5984	5984
57	5	2737	5308	5984	5984
58	5	3603	7288	5984	5984
59	5	2220	5188	4992	4992
60	5	2043	5032	5937	5938
61	5	1805	5007	5102	5077
62	5	2784	6288	4992	4992
63	5	3155	7146	5984	5984
64	5	2208	5156	4992	4992
65	5	3603	7146	5984	5984
66	5	2372	6216	4992	4992
67	5	3603	8186	5984	5984
68	5	2222	5082	4992	4992
69	5	3603	7690	5984	5984
70	5	2866	5954	4992	5514
71	5	2647	6912	5984	5984
72	5	2195	5156	4992	4992
73	5	3097	6562	5984	5984
74	5	3603	7146	5984	5984
75	5	3603	7170	5984	5984
76	5	1880	5022	4992	4992
77	5	1518	1323	3792	2362
78	5	3603	6696	5622	5622
79	5	3225	5816	5984	5984
80	5	3603	6678	5560	5984
81	5	2336	5100	4992	4992
82	5	3603	9742	5984	5984
83	5	3603	6488	5414	5414
84	5	3240	6068	5928	5928
85	5	2317	5794	4992	4992
86	5	3603	6166	5984	5984
87	5	2046	5128	4992	4992
88	5	1855	4062	4992	4992
89	5	2098	5970	4992	4992
90	5	1854	3793	4992	4992
91	5	2072	3758	5449	4212
92	5	1876	4006	4992	4042

Tracy and Banks Export Pumping (cfs)
DWRSIM Output 1922-1992

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	6	5719	11277	6016	6016
23	6	4817	7120	5008	5008
24	6	3750	3251	5008	3185
25	6	3927	7026	5008	5008
26	6	3719	7150	5008	5008
27	6	4831	6492	5008	5008
28	6	3719	7436	5008	5008
29	6	3750	3993	5008	4004
30	6	3719	5631	5008	5008
31	6	3750	938	901	4269
32	6	2915	4183	4797	4015
33	6	3750	2611	4386	5008
34	6	3750	1646	5008	4540
35	6	4827	7406	5008	5008
36	6	5089	7226	5008	5008
37	6	5719	7158	5008	5008
38	6	5719	10257	6016	6016
39	6	3719	7154	5008	5008
40	6	4551	7334	5008	5008
41	6	5719	7512	6016	6016
42	6	5719	9654	6016	6016
43	6	5719	5470	5008	5008
44	6	3719	7062	5008	5008
45	6	4875	7454	5008	5008
46	6	4467	7364	5008	5008
47	6	3719	7086	5008	5008
48	6	3719	7676	6016	6016
49	6	3719	6785	5008	5008
50	6	3821	7268	5008	5008
51	6	4229	7392	5008	5008
52	6	5719	9852	6016	6016
53	6	4066	9654	6016	6016
54	6	3719	7388	5008	5008
55	6	3719	7122	5008	5008
56	6	5719	8872	6016	6016
57	6	4041	7310	5008	5008
58	6	5719	11277	6016	6016
59	6	3719	7266	5008	5008
60	6	3719	7180	5008	5008
61	6	3719	6271	5008	5008
62	6	4135	6952	5008	5008
63	6	4851	7540	5008	5008
64	6	3719	7038	5008	5008
65	6	5719	7470	5008	5008
66	6	3719	7300	5008	5008
67	6	5719	10257	6016	6016
68	6	3719	7266	5008	5008
69	6	5719	9600	6016	6016
70	6	4292	7330	5008	5008
71	6	3867	7708	6016	6016
72	6	3719	7278	5008	5008
73	6	4739	7930	5008	5008
74	6	5719	7394	6016	6016
75	6	5719	8968	6016	6016
76	6	3750	4994	5008	5008
77	6	1502	13	676	1304
78	6	5719	5864	3371	3371
79	6	4988	7736	5008	5008
80	6	5719	5507	5008	5008
81	6	3719	7152	5008	5008
82	6	5719	9700	6016	6016
83	6	5719	7679	6016	6016
84	6	5017	7216	5008	5008
85	6	3719	7152	5008	5008
86	6	5719	6136	5008	5008
87	6	3719	7152	5008	5008
88	6	3719	3054	5008	5008
89	6	3719	6534	5008	5008
90	6	3750	4284	5008	5008
91	6	3750	4439	5008	3254
92	6	3750	4906	5008	4062

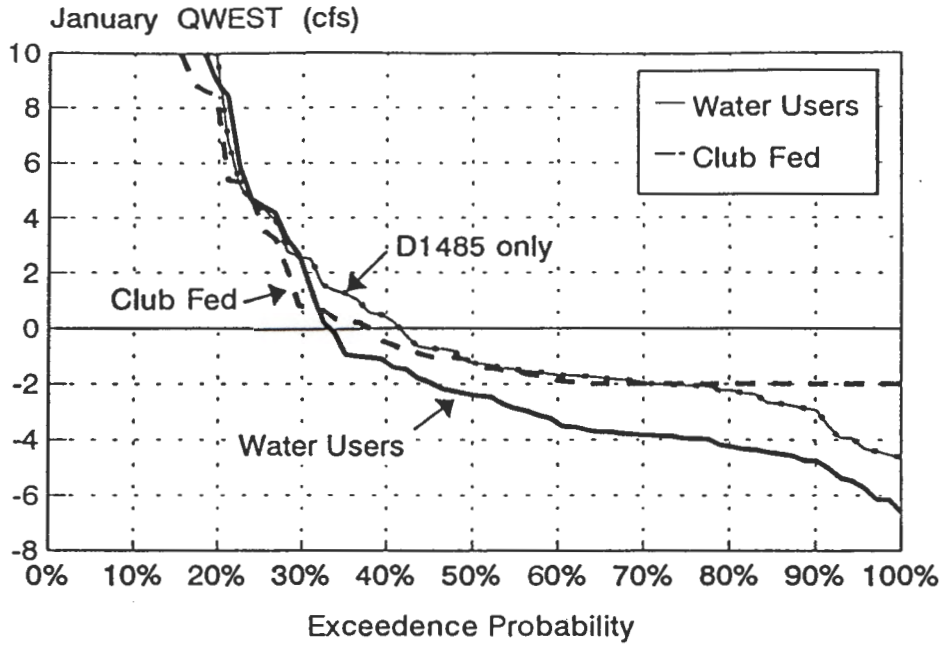
Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	7	9075	4478	5774	8214
23	7	9206	8256	9206	9206
24	7	9206	4060	9206	2799
25	7	9206	7861	9206	9206
26	7	9206	7862	9206	9206
27	7	9206	8106	7586	9206
28	7	9206	8850	9206	9206
29	7	9206	4177	9206	3164
30	7	9206	5453	9206	9206
31	7	5160	1664	241	3438
32	7	1747	3671	962	3712
33	7	8712	3208	5071	3872
34	7	9206	2773	5395	3594
35	7	9206	8186	9076	9206
36	7	9206	8210	9206	9206
37	7	9206	6825	7853	7056
38	7	7886	4910	4065	4994
39	7	9206	7864	9206	9206
40	7	9206	8852	9206	9206
41	7	9206	4060	5522	5522
42	7	9206	5223	6066	8506
43	7	9206	7104	6612	8766
44	7	9206	7852	9206	9206
45	7	9206	8206	9206	9206
46	7	9206	8222	9206	9206
47	7	9206	7866	9206	9206
48	7	9206	8286	9206	9206
49	7	9206	7220	9206	9206
50	7	9206	8228	6656	9206
51	7	9206	8874	9206	9206
52	7	7236	7486	6524	6882
53	7	9206	7637	9206	9206
54	7	9206	8831	9206	9206
55	7	9206	7870	9206	9206
56	7	9206	8351	6155	8597
57	7	9206	8872	9206	9206
58	7	9206	5892	6423	7260
59	7	9206	8258	9206	9206
60	7	9206	7910	9206	9206
61	7	9206	6453	9206	9206
62	7	9206	7685	9206	9206
63	7	9206	8774	9206	9206
64	7	9206	7858	9206	9206
65	7	9206	8798	9113	9206
66	7	9206	8272	9206	9206
67	7	9206	9326	9206	9206
68	7	9206	8256	9206	9206
69	7	4829	6579	4568	4577
70	7	9206	8809	9206	9206
71	7	9206	8862	9206	9206
72	7	9206	8294	9206	9206
73	7	9206	8848	9076	9206
74	7	9206	8214	7608	7993
75	7	9206	8828	8705	9206
76	7	9206	3499	9206	7297
77	7	566	1251	14	584
78	7	2892	3458	3237	5681
79	7	9206	7454	9156	9206
80	7	5898	3924	2157	4180
81	7	9206	7860	9206	9206
82	7	9206	7390	7818	7695
83	7	9206	7795	7856	7858
84	7	9206	8751	9206	9206
85	7	9206	7884	9206	9206
86	7	9206	7108	7123	9073
87	7	9206	7425	9206	9206
88	7	9206	3724	9206	9206
89	7	9206	7614	9206	9206
90	7	9206	3393	9206	5968
91	7	9206	4403	8877	3245
92	7	9206	5116	7127	3517

Tracy and Banks Export Pumping (cfs)
DWRSIM Output 1922-1992

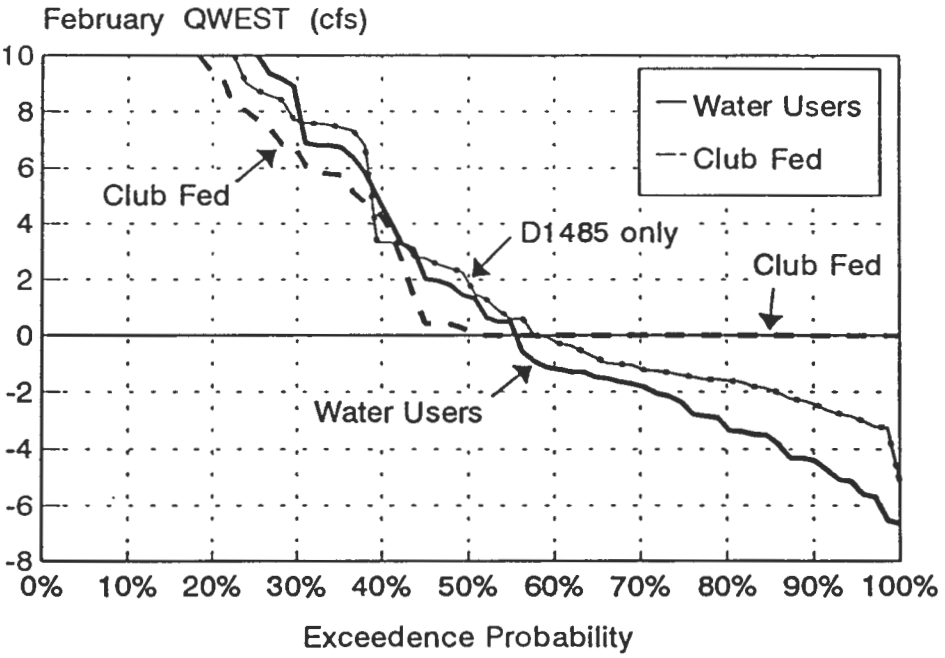
Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	8	8019	4917	6021	5960
23	8	9411	11287	11287	10899
24	8	8998	2152	5304	2672
25	8	11287	9288	10725	9893
26	8	11287	10432	10360	9875
27	8	11287	7209	6021	6793
28	8	11287	8982	11287	10883
29	8	10006	1840	4924	2655
30	8	3061	3793	8378	9743
31	8	506	152	1646	2752
32	8	3534	2659	3490	3395
33	8	2407	844	2087	2815
34	8	1493	587	1932	2750
35	8	11287	10226	9236	10511
36	8	11287	10340	11287	8642
37	8	11287	6911	5063	4985
38	8	5352	4729	5548	5121
39	8	11287	11287	11287	9090
40	8	11287	11287	11183	11092
41	8	9090	4473	4473	4473
42	8	11287	5150	5334	5273
43	8	8342	5727	5120	5055
44	8	11287	11287	11287	8167
45	8	11287	10619	9097	8854
46	8	11287	10636	10156	9027
47	8	11287	11287	11287	9043
48	8	11287	8777	11287	11287
49	8	8740	6892	11287	6309
50	8	11287	11054	9356	11287
51	8	11287	11287	11287	11287
52	8	6468	5837	6422	6422
53	8	11287	6916	7757	7802
54	8	11287	8655	10943	11287
55	8	11287	11287	11287	8278
56	8	11205	7800	9257	9202
57	8	10964	11287	11287	11287
58	8	8374	7175	6979	6643
59	8	11287	11287	11287	9776
60	8	11287	11287	11287	9153
61	8	11287	5978	9062	6712
62	8	11287	7571	11287	8353
63	8	11287	9096	9129	10293
64	8	11287	11287	11287	11043
65	8	11287	11287	10790	10861
66	8	11287	11287	11287	11287
67	8	6240	5927	5895	5895
68	8	11287	11287	10885	9776
69	8	5860	5359	5631	5631
70	8	11287	9409	9864	9262
71	8	11287	11287	10753	11287
72	8	11287	11287	11287	11287
73	8	11287	9186	9254	9248
74	8	10801	7593	8582	8587
75	8	11287	10580	9267	11130
76	8	7103	3635	9395	7095
77	8	1284	944	1143	1143
78	8	4225	4473	4703	4637
79	8	11287	7531	5887	6462
80	8	5134	4873	4942	4877
81	8	11287	11287	11239	9775
82	8	9752	8003	8938	8943
83	8	10743	10177	10177	10178
84	8	11287	8194	6521	7995
85	8	11287	11287	11287	11287
86	8	8606	5741	5376	5052
87	8	10438	7777	11287	8820
88	8	9415	1178	11287	5832
89	8	7825	6601	6390	11287
90	8	4618	1253	3939	2668
91	8	5938	2183	2568	5726
92	8	5583	2274	2985	2907

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	9	6522	6413	6669	6522
23	9	6788	6306	6256	5958
24	9	3239	3330	4688	3411
25	9	5890	5420	6496	5494
26	9	6086	5313	5276	5356
27	9	6309	6034	6036	6081
28	9	6965	5314	7124	5894
29	9	4084	3963	4503	4155
30	9	5231	5194	5341	5503
31	9	2618	3457	2987	3400
32	9	5394	5060	5580	5391
33	9	4282	3468	4022	3761
34	9	3513	3540	3783	4240
35	9	6395	5889	7075	5893
36	9	10342	5919	6665	5967
37	9	5777	6039	6113	6113
38	9	11243	11243	11243	11243
39	9	5386	6083	6108	4789
40	9	11243	7718	7448	6827
41	9	6963	9129	7919	7919
42	9	7919	9282	9917	9328
43	9	5977	5998	5976	5976
44	9	8817	6904	7560	5592
45	9	6039	5721	6108	6108
46	9	8912	5891	6175	5892
47	9	6839	5863	8387	5555
48	9	6634	6952	7451	7992
49	9	5615	5957	6088	5935
50	9	8537	5724	7914	6547
51	9	8717	8791	7113	6560
52	9	11243	11243	11243	11243
53	9	7135	8422	7620	7067
54	9	8439	6149	6336	6338
55	9	6062	7374	7236	5971
56	9	9378	10729	11035	10065
57	9	8096	8916	8654	6326
58	9	11243	11243	11243	11243
59	9	9009	6510	9716	6357
60	9	6442	7645	10286	5948
61	9	5652	6054	5856	6012
62	9	6008	6252	8162	6243
63	9	7190	6512	6740	6604
64	9	6865	5549	10422	5456
65	9	7114	6660	7904	6289
66	9	9025	7482	10019	6141
67	9	11243	11243	11243	11243
68	9	6583	6143	6289	6198
69	9	11243	11243	11243	11243
70	9	6666	5930	6024	5981
71	9	9933	8631	8343	7315
72	9	9766	9114	10890	7327
73	9	7541	6657	6734	6690
74	9	11243	11243	11243	11243
75	9	10199	9707	11243	10035
76	9	4637	4241	4617	4616
77	9	2078	3581	2834	3684
78	9	8181	7551	6491	6399
79	9	6618	6163	6214	6168
80	9	9177	9414	8652	8268
81	9	5986	5495	5643	5640
82	9	11243	11243	11243	11243
83	9	8388	8388	8388	8389
84	9	8374	8125	8397	9507
85	9	10771	8736	9156	6013
86	9	8218	7719	8094	8097
87	9	4909	4695	8795	5421
88	9	4277	3401	6592	4757
89	9	7134	6393	7152	9310
90	9	4251	3988	4604	4559
91	9	5012	4788	5504	5983
92	9	3725	3431	3870	3929

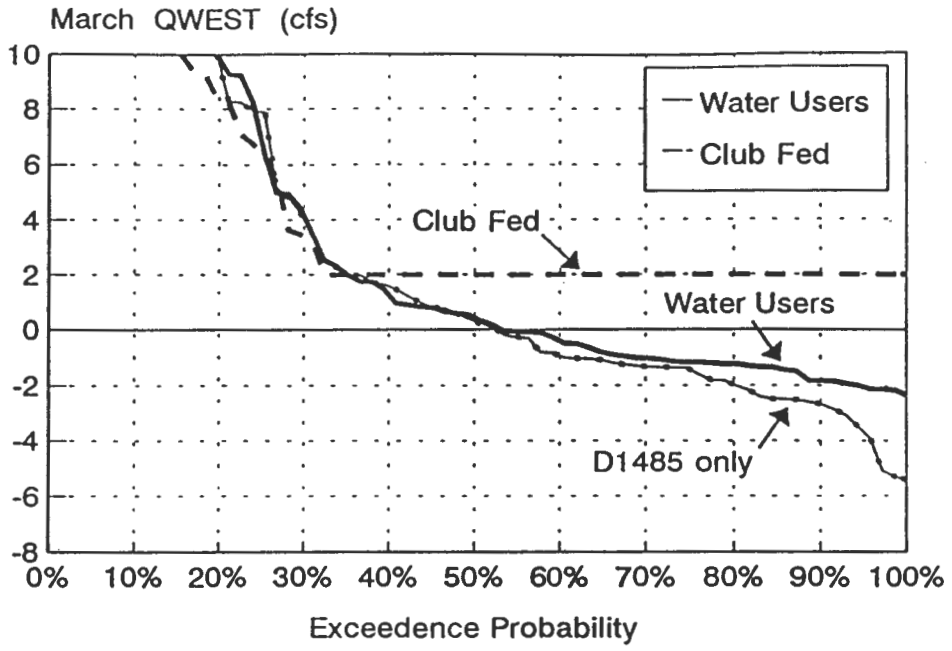
January QWEST
DWRSIM Output 1922-1992



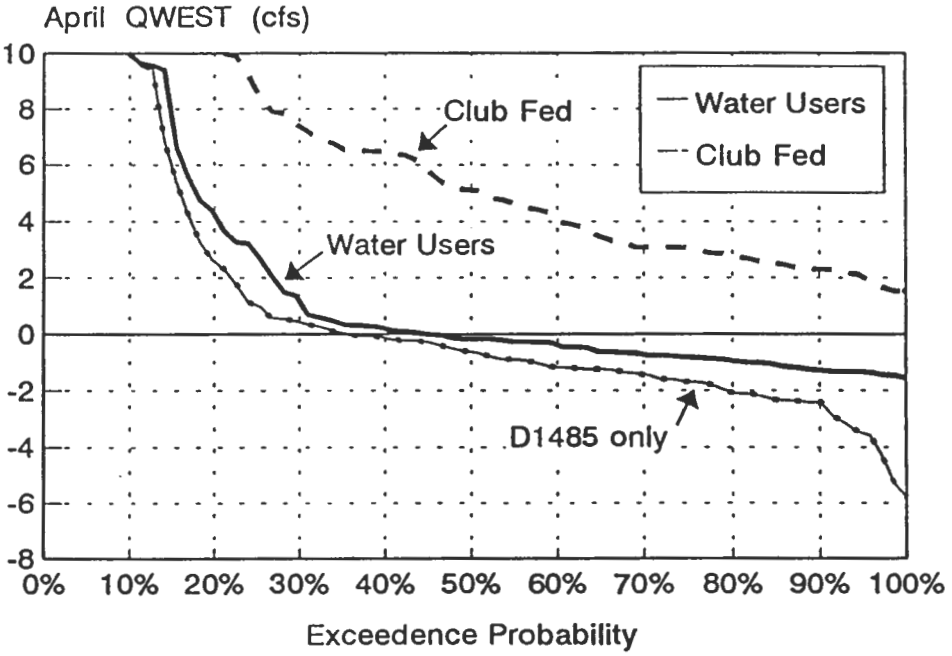
February QWEST
DWRSIM Output 1922-1992



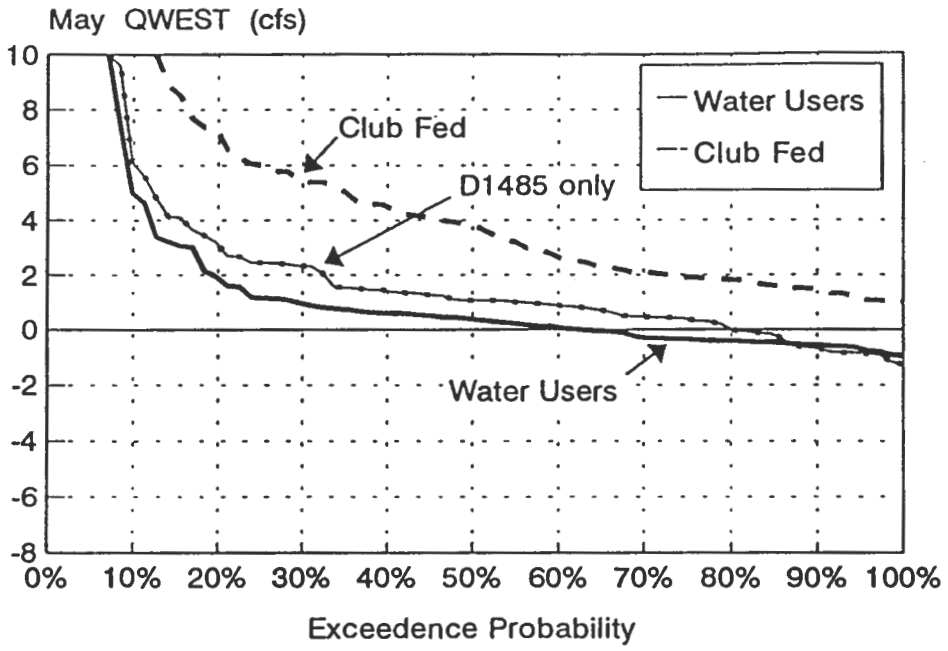
March QWEST
DWRSIM Output 1922-1992



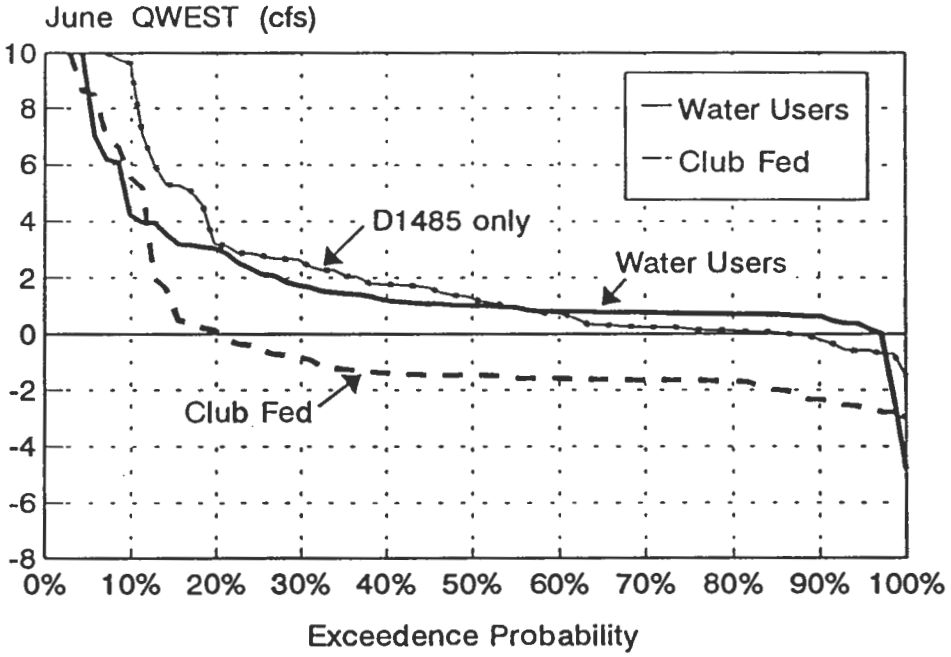
April QWEST
DWRSIM Output 1922-1992



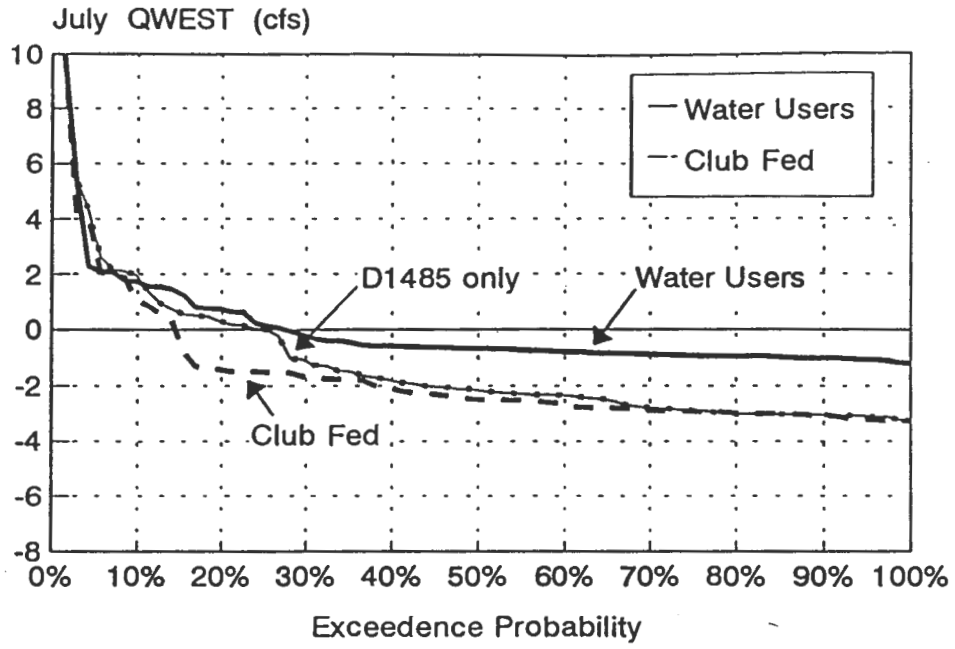
May QWEST
DWRSIM Output 1922-1992



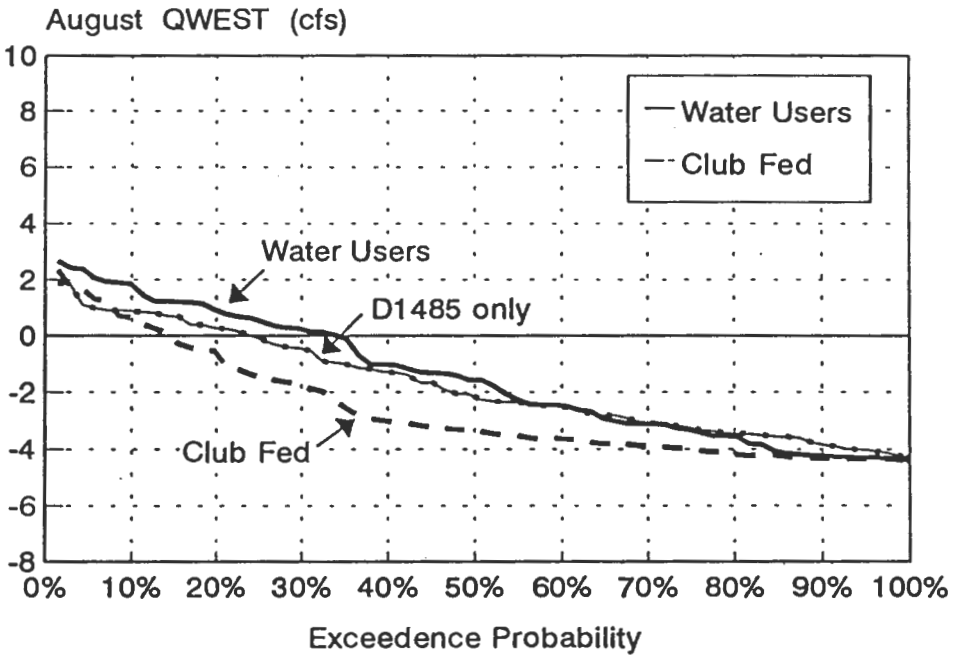
June QWEST
DWRSIM Output 1922-1992



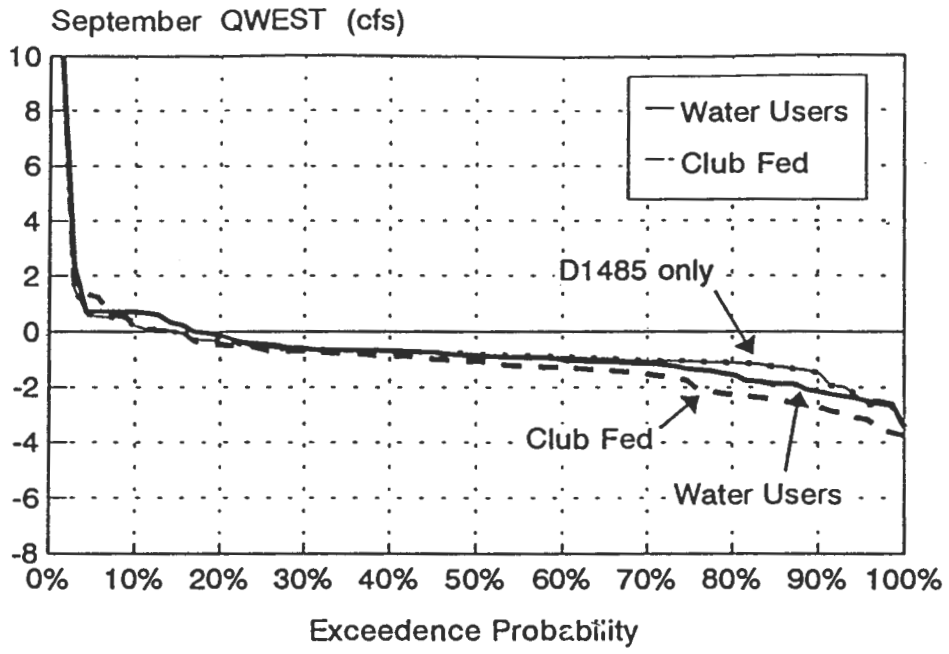
July QWEST
DWRSIM Output 1922-1992



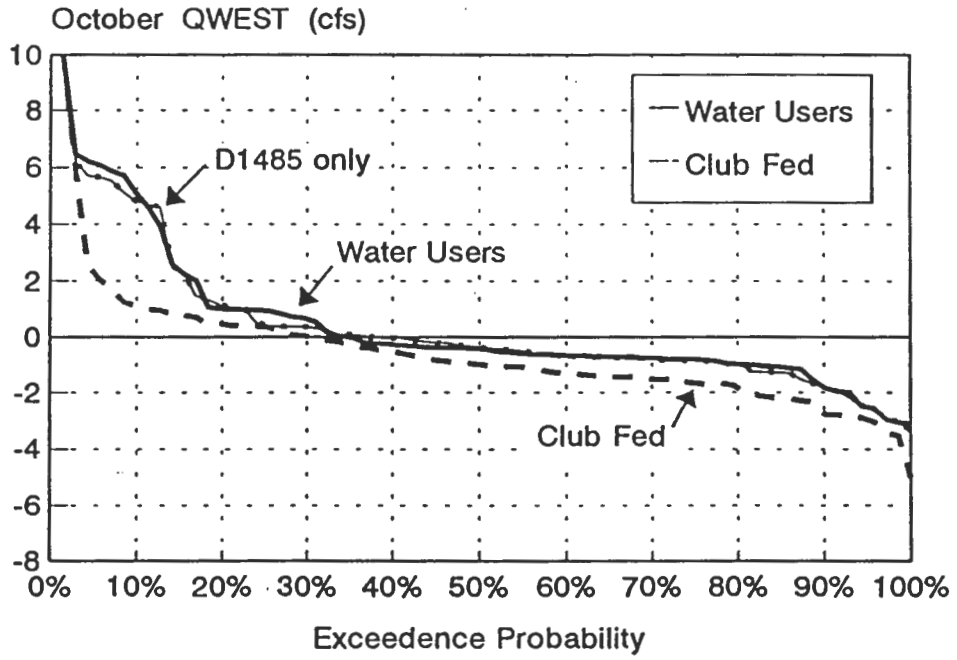
August QWEST
DWRSIM Output 1922-1992



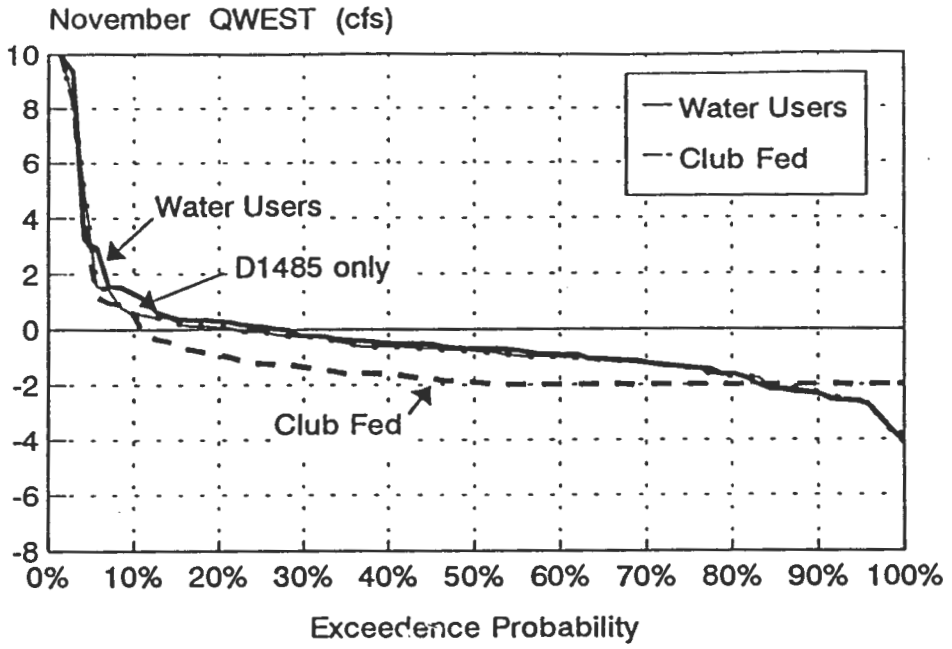
September QWEST
DWRSIM Output 1922-1992



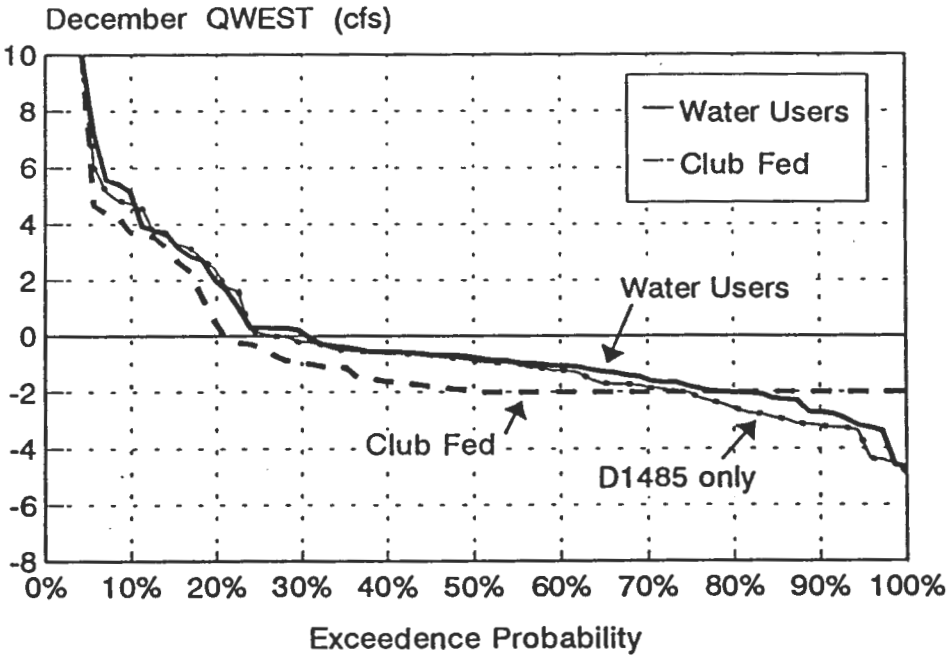
October QWEST
DWRSIM Output 1922-1992



November QWEST
DWRSIM Output 1922-1992



December QWEST
DWRSIM Output 1922-1992



QWEST (cfs)
DWRSIM Output 1922-1992

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
21	10	360	-369	429	-375
22	10	-2901	-1833	-2246	-2912
23	10	-1069	170	-1645	-861
24	10	-94	-701	-2	-189
25	10	-1412	-782	-1567	-841
26	10	-1182	-591	-1301	-640
27	10	-1690	-735	-1564	-827
28	10	-1349	43	-1616	-816
29	10	183	-421	266	413
30	10	-169	947	-878	-403
31	10	2057	726	1862	1452
32	10	471	1067	-323	1137
33	10	1677	935	1478	1317
34	10	675	979	627	374
35	10	-1850	-1114	-1837	-1282
36	10	-701	-510	-839	-708
37	10	-133	-648	-90	-438
38	10	418	5708	960	5652
39	10	-1228	-178	-1450	-154
40	10	-1438	-381	-466	-36
41	10	-2331	2238	-427	2227
42	10	-866	5110	742	4791
43	10	-833	-597	-524	99
44	10	-1324	-743	-1646	-863
45	10	-1294	-657	-1202	-33
46	10	-1654	-993	-1622	-1001
47	10	-1687	-1052	-1850	-1262
48	10	-2777	-1159	-1859	1289
49	10	-1383	-790	-1518	-764
50	10	-2781	-1973	-2450	-2201
51	10	-1520	-793	-1687	-733
52	10	803	6083	5111	5111
53	10	-3424	-3098	-3289	-3360
54	10	-1531	-968	-1640	-972
55	10	-1067	-686	-1265	-725
56	10	390	3933	1486	4692
57	10	-2182	-2498	-2344	-2349
58	10	392	5856	4843	5701
59	10	-292	-641	-527	-630
60	10	520	-407	479	-464
61	10	-556	-288	-1083	-204
62	10	-4985	-1057	-43	51
63	10	-3528	-2952	-3562	-2598
64	10	-958	-307	-1180	-682
65	10	-2080	-358	-2105	369
66	10	-1074	-603	-1283	-588
67	10	983	6477	1117	5522
68	10	-1499	-813	-1599	-896
69	10	84	4603	1617	4604
70	10	-1438	-709	-1495	-752
71	10	-2857	-3050	-2979	-3028
72	10	-2143	-1962	-2220	-1683
73	10	-2277	-1534	-1988	-1523
74	10	-3033	-534	-2375	190
75	10	-1693	-865	-1208	326
76	10	949	0	282	107
77	10	2530	995	975	1015
78	10	-939	-950	-1606	-1942
79	10	-1533	-689	-2264	-1855
80	10	-422	2604	2868	2519
81	10	-1009	-216	-1145	-308
82	10	5925	6212	6212	6212
83	10	14590	14590	14590	14589
84	10	-2227	-2556	-1461	-1269
85	10	67	-242	-206	-291
86	10	-657	-385	-230	-9
87	10	794	684	590	521
88	10	1237	2014	644	-87
89	10	-494	540	-773	-736
90	10	-379	988	-423	368
91	10	1108	848	1110	1067

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
21	11	-1922	-243	-1076	-243
22	11	-1533	133	-75	-75
23	11	-1871	-755	-1448	-619
24	11	-1278	-900	-920	-1013
25	11	-1730	-256	-1280	-273
26	11	-2000	-929	-754	-754
27	11	-1864	-4146	-2000	793
28	11	-2005	-1338	-1939	-1169
29	11	-1119	-498	-745	-1046
30	11	-1490	-353	-751	-1060
31	11	-359	296	1311	-89
32	11	-904	190	-118	407
33	11	-992	366	-142	-923
34	11	-1596	-923	-1197	-1412
35	11	-2008	-702	-1476	-643
36	11	-1247	-514	-405	-280
37	11	-2000	98	-2000	-3811
38	11	-2000	-1164	-1613	-1359
39	11	-1272	-672	-570	-644
40	11	1171	-1302	-1644	-1131
41	11	-2000	-434	-618	-465
42	11	-1603	1549	1452	1425
43	11	-2009	-2597	-2000	-2093
44	11	-2000	-1436	-1363	-1311
45	11	-2000	-2188	-1826	-294
46	11	-2004	-910	-1740	-971
47	11	-2004	-1087	-1830	-1185
48	11	-2000	-1120	-2000	-2149
49	11	-2008	-700	-1511	-663
50	11	3916	2927	4672	4948
51	11	-2000	-2337	-2000	-1690
52	11	-2000	1524	-454	-94
53	11	-2000	-239	-133	120
54	11	-2000	-2188	-2000	-2653
55	11	-2005	-1626	-2009	-1727
56	11	-2000	-2284	-2000	-2284
57	11	-2000	-1387	-1161	-1196
58	11	-2000	1110	-1636	-1640
59	11	-1600	-1142	-1010	-194
60	11	-2005	-1640	-2008	-1692
61	11	-1906	-689	-1348	-1124
62	11	-2000	-3187	-1757	-1757
63	11	-2000	-3678	-2000	-3729
64	11	-2000	-2308	-2000	-2431
65	11	591	-2718	-2000	-2077
66	11	-2000	-2572	-2006	-2583
67	11	-2000	1324	246	511
68	11	-2005	-1443	-2008	-1445
69	11	-1600	3230	436	433
70	11	-1596	-501	-405	559
71	11	-2000	-2549	-2000	-2549
72	11	-832	-520	-516	-520
73	11	925	658	796	1564
74	11	-2000	-828	-828	-828
75	11	-2000	-629	-1151	-635
76	11	-703	-528	-940	-1017
77	11	969	280	243	88
78	11	-2000	-2016	-2000	-2189
79	11	-2000	-1774	163	71
80	11	-2000	-1085	-1085	-1085
81	11	-2000	-4	-2000	-3298
82	11	8286	9383	8287	8287
83	11	21208	22538	21208	21207
84	11	-1225	-1250	-1069	-764
85	11	-1405	-729	-1012	-846
86	11	-738	-426	-1480	-788
87	11	-429	-380	224	179
88	11	-1738	485	-1399	-1002
89	11	-1348	330	-444	-697
90	11	-1788	349	-1215	-694
91	11	-171	12	430	121

QWEST (cfs)
DWRSIM Output 1922-1992

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
21	12	-1858	-562	-566	-563
22	12	2642	3161	3156	3147
23	12	-2007	-1072	-2006	-651
24	12	-2006	-1328	-1818	-1727
25	12	-1132	-678	-674	-802
26	12	-2000	-3205	-2000	-3150
27	12	-2000	-2058	-1996	-1760
28	12	-2000	-1803	-1711	-1888
29	12	-2000	-2726	-2000	-2915
30	12	-232	-399	-68	-977
31	12	-2000	-1109	-743	-1244
32	12	-286	289	-164	4
33	12	-2000	-1669	-2000	-2448
34	12	-2008	-1616	-1792	-2001
35	12	-1587	-958	-2010	-958
36	12	-2004	-674	-2005	-645
37	12	-685	-685	-12	2414
38	12	-2000	1636	-212	108
39	12	-1648	-1265	-1037	-1158
40	12	-1516	-1669	-2000	-1150
41	12	3185	7169	3737	4557
42	12	-2000	-2257	-2000	-2227
43	12	-2008	-780	-1639	-780
44	12	-1932	-970	-746	-534
45	12	4659	2871	5077	6059
46	12	-2000	-2024	-2000	-1721
47	12	-2004	-855	-1318	-1543
48	12	-2000	-2001	-2007	-2337
49	12	-1497	-988	-933	-1250
50	12	14544	12929	13453	20967
51	12	1370	1022	1444	1770
52	12	557	3711	3711	3711
53	12	-2000	-2971	-2000	-2971
54	12	-2000	-470	-2000	-4370
55	12	4265	5564	3292	3323
56	12	-2010	-552	-821	-482
57	12	-2000	-4566	-2000	-4566
58	12	-2000	-81	-528	-862
59	12	-1735	-1414	-2010	-3201
60	12	-2000	-3396	-2000	-3365
61	12	-2000	-3266	-2000	-3263
62	12	-2000	-282	-2000	-4879
63	12	-2002	-2784	-2000	-2784
64	12	3630	5428	2258	2805
65	12	-1817	-719	-590	-24
66	12	-93	-1204	-111	-230
67	12	-2000	2029	1317	1605
68	12	-1684	-616	-616	-594
69	12	2320	5146	5146	5146
70	12	4379	3923	4109	4728
71	12	-2000	-1070	-780	-550
72	12	-2000	-4661	-2000	-4396
73	12	3722	3785	3785	4833
74	12	-2000	-571	-571	-572
75	12	-2005	-2222	-2000	-2751
76	12	-1013	-2721	-2005	-1690
77	12	-2000	-2077	-2000	-3130
78	12	-2006	-365	-939	-338
79	12	-2000	-863	-710	-684
80	12	-2000	296	-1861	-1861
81	12	3553	2727	3551	3553
82	12	25525	29442	26304	26303
83	12	37972	38970	37978	37978
84	12	-1891	-1891	-1891	-1305
85	12	-2000	-1983	-1983	-1983
86	12	-878	214	26	214
87	12	-2000	-2311	-2000	-2613
88	12	-1093	-586	-535	-946
89	12	-914	-1448	-670	-3280
90	12	-439	321	68	-208
91	12	-1113	305	-658	-979

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	1	216	-3727	216	216
23	1	3561	4192	2777	4296
24	1	-2005	-3646	-2004	-2707
25	1	353	-2464	2005	-726
26	1	-2000	-6144	-2009	-2063
27	1	-2000	-3723	-2000	-3523
28	1	-2000	-4578	-2000	-4324
29	1	-1427	-3812	-1913	-2007
30	1	-2000	-4738	-2000	-4628
31	1	-1020	-3868	-1866	-1860
32	1	-1491	-5367	-1124	-1564
33	1	-1490	-4357	-419	-2339
34	1	-1930	-5740	-1445	-2076
35	1	-2000	-2877	-2000	-2877
36	1	-1412	-1476	-1474	-1475
37	1	-1665	-4238	-1121	-1711
38	1	-2000	-2185	-1832	-819
39	1	-2	-138	2052	2507
40	1	-1699	-1795	-1717	-1696
41	1	5374	5892	5803	6781
42	1	11965	14783	13189	14783
43	1	10173	15041	14062	15040
44	1	-2000	-4747	-725	-2105
45	1	-1840	-3973	-1781	-1824
46	1	-452	240	334	544
47	1	-2010	-5009	-2008	-1522
48	1	-2000	-6144	-1478	-2942
49	1	-2006	-2963	160	-2786
50	1	-2000	-4186	-2000	-3941
51	1	8461	10866	10124	10275
52	1	12616	12245	12925	13499
53	1	8894	11799	10175	10175
54	1	-2000	-940	-2000	-2246
55	1	-2000	-2707	-2000	-2699
56	1	24444	24658	24610	27623
57	1	-2005	-3529	-1070	-1994
58	1	-1117	-1100	-1057	-666
59	1	-2000	2664	2579	2579
60	1	-1061	-3958	161	-1775
61	1	-2000	-3775	-229	-2241
62	1	-888	-3120	679	-1277
63	1	-1049	-3526	-1744	-1287
64	1	-2000	-3946	-2000	-3937
65	1	12650	12624	12650	12945
66	1	-2000	-2427	-2000	-1867
67	1	3220	3205	3235	3917
68	1	719	4438	871	1359
69	1	13995	12529	13831	14860
70	1	29192	32296	29704	29705
71	1	-796	-1019	-791	-241
72	1	-2000	-5480	-1636	-1439
73	1	4713	4730	4730	5192
74	1	8634	8973	8650	9951
75	1	-2000	-2265	1561	1561
76	1	-2007	-3245	-1961	-736
77	1	805	-4338	703	488
78	1	5317	8458	4135	4520
79	1	-2000	-1415	-2000	-2051
80	1	15159	17493	17341	22097
81	1	-2000	1439	119	1240
82	1	10404	10950	10979	11433
83	1	33095	35798	35505	35505
84	1	28999	31768	31472	31472
85	1	661	-1046	1185	2759
86	1	-2000	-4450	-2000	-4403
87	1	-1916	-3836	-1775	-1734
88	1	-2000	-4509	-2000	-4550
89	1	-603	-3864	498	-1669
90	1	-2000	-6617	-2000	-2390
91	1	2113	-2374	1246	1010
92	1	242	-1958	-1165	-1212

QWEST (cfs)
DWRSIM Output 1922-1992

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	2	6795	6795	6796	6795
23	2	5753	5832	1293	1296
24	2	0	-4312	0	-2853
25	2	1453	1447	1608	1511
26	2	0	-1286	0	-1052
27	2	7694	6876	7102	8423
28	2	0	-2146	0	-1019
29	2	0	-4416	0	-2231
30	2	0	-5716	0	-1471
31	2	-1	-2048	-10	-1229
32	2	0	489	0	2259
33	2	427	-1714	0	-1403
34	2	-6	-3511	0	-2011
35	2	-3	-934	-3	-1863
36	2	11740	11703	12283	13054
37	2	6843	6795	7594	7574
38	2	27119	31743	31030	35173
39	2	-1	2022	0	2535
40	2	2737	490	3470	3326
41	2	11054	12414	12718	12718
42	2	16264	17464	17464	17464
43	2	12629	12691	12629	12690
44	2	0	-1129	0	-996
45	2	4761	4969	4820	7589
46	2	414	1806	0	5
47	2	0	-5086	0	-285
48	2	-7	-3367	-7	-3025
49	2	-9	-3389	-5	-2639
50	2	0	-1813	0	-1813
51	2	8252	11300	8547	7721
52	2	5838	6378	7430	7430
53	2	267	4138	2402	2401
54	2	0	3300	879	3300
55	2	0	-4743	-2	-2291
56	2	9204	10456	10581	10300
57	2	0	-566	0	593
58	2	9467	11965	9988	11284
59	2	6083	9160	7250	7316
60	2	0	-3504	0	-3230
61	2	0	-5140	0	-5140
62	2	4476	1965	3588	3323
63	2	5139	6730	2879	7542
64	2	0	-3827	-6	-1650
65	2	0	-2889	0	-1560
66	2	0	-2797	0	908
67	2	400	1340	1207	2762
68	2	5791	10195	9031	9030
69	2	28280	32310	32121	32582
70	2	10884	13896	12472	12480
71	2	0	-1301	0	-2773
72	2	0	-1635	0	-1605
73	2	10335	9361	11609	11824
74	2	0	3060	0	2830
75	2	7403	10740	10741	10805
76	2	0	-6523	-4	-789
77	2	-9	-2348	-5	-580
78	2	3823	10539	6595	8565
79	2	8038	8903	7165	8753
80	2	26122	32808	32808	32808
81	2	63	654	592	596
82	2	11121	16889	15732	17101
83	2	55714	58484	56865	56865
84	2	15094	15829	15829	15828
85	2	0	-1205	-4	-370
86	2	30701	34812	37335	37589
87	2	0	-5600	0	-1263
88	2	-2	-4326	-2	-3254
89	2	-5	-1468	-7	-1319
90	2	0	-6629	0	-2425
91	2	-2	-2860	-4	-78
92	2	0	-1531	0	-1556

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	3	3632	3480	3602	3471
23	3	1998	-1181	-6	200
24	3	1997	949	-6	-2498
25	3	2000	-1231	0	-1043
26	3	2000	-1925	-2	-3063
27	3	2000	-123	0	368
28	3	7101	10608	9200	12415
29	3	1997	899	0	-2419
30	3	2000	-1231	0	-3498
31	3	1996	557	119	1646
32	3	1994	1731	1053	-1353
33	3	2000	-811	0	-2859
34	3	1998	-498	0	-1309
35	3	2000	823	0	-2173
36	3	2000	-2173	0	-2529
37	3	10538	10639	11403	11302
38	3	34817	37132	36934	37157
39	3	2000	195	0	994
40	3	6336	4940	5395	5226
41	3	13190	14397	14175	14490
42	3	2000	789	918	789
43	3	20285	21218	20286	21231
44	3	2000	-1157	0	-2690
45	3	2000	596	396	825
46	3	2000	-518	0	-1367
47	3	2000	-909	0	-1202
48	3	2000	-1026	-2	-5302
49	3	2000	-81	316	582
50	3	2000	-1302	0	-1019
51	3	2000	1454	2096	1215
52	3	8236	12586	9135	10586
53	3	2000	-103	0	-321
54	3	2000	1980	1381	1981
55	3	1997	-1350	-2	-2607
56	3	2000	335	0	-289
57	3	2000	2557	0	2438
58	3	19781	20953	17736	21351
59	3	1991	-1835	0	1457
60	3	2000	-1173	0	-5094
61	3	2000	-1458	0	-2506
62	3	1999	-2364	0	-5437
63	3	2000	-1041	0	-842
64	3	1997	-1345	-3	-1088
65	3	2000	-2010	0	74
66	3	2000	-2136	0	-1829
67	3	5548	6421	5967	7893
68	3	2000	1733	1819	1733
69	3	11157	12455	12282	12454
70	3	3195	4446	4307	4228
71	3	2000	-278	0	1986
72	3	2000	-1488	0	-1047
73	3	6746	9284	7406	8294
74	3	9422	13214	11577	13214
75	3	10792	12279	12456	12775
76	3	2000	-1203	0	-818
77	3	1998	-61	-8	-219
78	3	9291	9238	8638	7958
79	3	3458	4969	4811	4761
80	3	23453	25359	25487	25359
81	3	2000	2312	1366	2247
82	3	20159	23600	22182	23600
83	3	72611	73265	73265	73265
84	3	8406	8263	8263	8262
85	3	2000	639	0	-1257
86	3	36138	37255	37073	36734
87	3	2000	-1853	0	-1825
88	3	1994	-1090	-2	-1347
89	3	2000	-2141	0	-2029
90	3	1997	-966	0	-1370
91	3	2000	-1842	0	-3930
92	3	2000	-640	0	-1623

QWEST (cfs)
DWRSIM Output 1922-1992

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	4	7452	253	188	-1579
23	4	7188	694	0	-2163
24	4	1521	-1143	-8	-2406
25	4	6471	595	0	-4324
26	4	5750	109	0	-776
27	4	10834	4374	1029	1784
28	4	6399	478	0	-2352
29	4	2277	-767	-9	-2401
30	4	3076	-1008	0	-2101
31	4	1657	-819	-1	25
32	4	3882	-293	-2	-80
33	4	2868	-614	-8	-97
34	4	2298	-1335	-3	-222
35	4	11435	4732	1360	1137
36	4	6478	-172	0	-400
37	4	6860	51	0	-3573
38	4	14328	10213	10213	10286
39	4	2761	-1264	-9	-892
40	4	9228	2678	0	-1434
41	4	16776	12190	12352	12373
42	4	12742	5538	6034	4229
43	4	8432	1484	1752	562
44	4	3090	-270	-2	-885
45	4	4773	-269	-6	-289
46	4	4797	-206	-10	-62
47	4	3091	-1238	0	-1698
48	4	6513	-19	0	-5306
49	4	4298	-454	0	-1946
50	4	5118	-449	0	-1597
51	4	4622	-33	-7	-215
52	4	15444	9411	9458	9458
53	4	5168	-748	0	-3145
54	4	7916	2040	0	-1238
55	4	2890	-173	-2	-2297
56	4	6347	-655	0	-3443
57	4	4426	-1042	-1	-1189
58	4	28775	23556	23556	23555
59	4	2342	-940	-4	-1028
60	4	2682	-1444	-2	-2336
61	4	2153	-1315	-5	-1768
62	4	3757	-741	-1	-2106
63	4	15655	9639	6128	5384
64	4	2484	-821	-2	-1384
65	4	10885	3663	2128	460
66	4	3480	-619	-2	-1144
67	4	16157	9584	9661	9522
68	4	3097	-1001	-7	-519
69	4	14697	10600	10600	10600
70	4	3955	-471	-5	344
71	4	5086	-663	0	141
72	4	3065	-852	-2	-1335
73	4	5384	-166	0	-191
74	4	9880	3236	3071	547
75	4	6776	333	0	-2893
76	4	1895	-1315	-3	-1681
77	4	1521	134	-9	976
78	4	12113	6619	6913	6847
79	4	6142	324	0	2316
80	4	7848	3263	3263	3262
81	4	3263	-1431	0	-650
82	4	41906	38992	38976	38991
83	4	43058	39902	39903	39901
84	4	6539	1361	-8	2648
85	4	3331	-146	-4	-595
86	4	19549	14520	13118	13736
87	4	2586	-1313	-3	-1237
88	4	2136	-878	-3	-915
89	4	4477	-1170	0	-5791
90	4	2326	-1537	-8	260
91	4	2965	281	0	-1250
92	4	2503	-290	0	-1177

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	5	11516	4631	5984	6106
23	5	4212	526	2668	2675
24	5	1044	-498	149	828
25	5	3728	644	-750	-846
26	5	2083	-624	1084	1091
27	5	5441	-818	-140	-140
28	5	3268	-460	-379	1510
29	5	1534	-22	688	949
30	5	2085	-328	1368	1372
31	5	1330	1593	2776	445
32	5	2946	820	2067	2386
33	5	1968	972	225	498
34	5	1075	1181	325	456
35	5	6001	467	-744	-826
36	5	4580	599	-236	-610
37	5	5381	1171	4137	4137
38	5	19645	16478	18621	18620
39	5	1664	-406	533	423
40	5	4164	49	-623	-718
41	5	8902	2164	3654	3654
42	5	8512	1951	2324	2334
43	5	4995	605	24	-325
44	5	2567	538	920	909
45	5	3996	682	2699	2697
46	5	2980	414	-543	-1190
47	5	1630	-438	1072	1072
48	5	5782	619	-913	-899
49	5	2501	-47	769	721
50	5	3529	21	2432	2435
51	5	4616	458	-920	-946
52	5	16385	11360	13676	13676
53	5	5268	-934	-38	-35
54	5	3808	178	-501	-851
55	5	2460	131	635	635
56	5	10032	3069	4807	4807
57	5	4109	771	-1272	2453
58	5	10752	3225	5626	5626
59	5	1874	-615	870	870
60	5	1897	-419	477	476
61	5	1514	-533	988	1012
62	5	2766	-313	2331	2334
63	5	6251	219	633	-155
64	5	1843	-359	1076	1077
65	5	5381	-654	-623	-656
66	5	2259	-459	1333	1333
67	5	13521	7388	9589	9589
68	5	2176	-348	1256	1256
69	5	26394	24396	26100	26100
70	5	3226	128	-734	1455
71	5	6044	-264	784	784
72	5	2044	-427	1076	1076
73	5	4370	274	-1189	-1284
74	5	5781	1102	301	301
75	5	7384	883	2068	2068
76	5	1067	-983	135	-74
77	5	1007	1583	847	1566
78	5	7300	3392	3451	3450
79	5	3949	747	2091	1460
80	5	6565	3034	2783	2448
81	5	1795	-377	1355	1355
82	5	24712	18562	22318	22318
83	5	35739	32855	33928	33927
84	5	4598	1143	11	3210
85	5	2274	-563	1537	1537
86	5	7699	5009	4118	4118
87	5	1510	-555	522	413
88	5	1199	-113	335	198
89	5	1908	-787	1257	1267
90	5	1450	360	455	314
91	5	1811	313	403	1064
92	5	1327	-78	528	987

QWEST (cfs)
DWRSIM Output 1922-1992

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	6	5578	21	5281	5281
23	6	-1875	1673	2275	2275
24	6	-1679	1857	-588	697
25	6	-1462	1023	2019	1640
26	6	-1661	696	67	76
27	6	-1580	960	3135	3135
28	6	-1242	735	1832	537
29	6	-1457	1523	-383	326
30	6	-1570	811	342	347
31	6	-1624	3538	2353	-26
32	6	-743	2085	994	915
33	6	-1435	2521	101	-337
34	6	-1617	3044	-540	-207
35	6	-2790	377	2334	1195
36	6	-2648	776	2651	2272
37	6	-2322	1354	2652	2651
38	6	11158	10589	14829	14830
39	6	-1641	710	-577	-577
40	6	-1136	1412	2773	2393
41	6	494	3089	4584	4584
42	6	1648	-2287	1351	1350
43	6	-2550	771	2879	2674
44	6	-1293	947	246	246
45	6	-2008	1434	2064	2063
46	6	-2988	387	2263	1374
47	6	-1576	825	143	145
48	6	-203	1135	1693	1461
49	6	-1564	778	134	142
50	6	-1356	845	1758	1761
51	6	-1600	1069	2421	1125
52	6	6626	6186	10021	10022
53	6	219	-4819	-1489	-1490
54	6	-1208	773	2080	1701
55	6	-1565	796	152	152
56	6	1969	4231	7086	7086
57	6	-1336	1228	1770	1770
58	6	6980	3954	9635	9636
59	6	-1461	642	17	17
60	6	-1628	727	314	314
61	6	-1628	745	94	96
62	6	-2097	471	891	894
63	6	-2429	190	2931	2027
64	6	-1463	995	241	244
65	6	-2532	721	2943	2871
66	6	-1436	674	268	262
67	6	8625	7031	13041	13041
68	6	-1452	649	239	239
69	6	8499	12764	16347	16348
70	6	-893	1009	2345	1049
71	6	-332	1093	2785	2784
72	6	-1413	690	258	258
73	6	-2776	695	2785	2660
74	6	-1478	1491	2870	2869
75	6	-551	2342	5294	5294
76	6	-1651	799	-561	-561
77	6	157	3969	2177	1733
78	6	-377	2875	5998	5998
79	6	-2333	1082	733	733
80	6	-792	3189	5087	5087
81	6	-1634	716	87	87
82	6	5188	6074	9757	9757
83	6	33482	31523	33184	33185
84	6	-704	1740	3097	1802
85	6	-1585	788	136	130
86	6	403	3161	4498	3202
87	6	-1639	715	-577	-576
88	6	-1711	2127	-690	-688
89	6	-1626	761	184	194
90	6	-1971	1160	-695	-688
91	6	-1452	1031	-495	742
92	6	-1680	626	-729	-59

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	7	-1996	1232	-59	-1709
23	7	-2508	-688	-2760	-2722
24	7	-3022	-327	-3058	731
25	7	-3109	-856	-2390	-2330
26	7	-3015	-942	-3040	-3031
27	7	-1494	-562	-640	-1783
28	7	-2368	-1061	-2334	-2342
29	7	-3004	-386	-3069	463
30	7	-2887	-584	-3017	-3011
31	7	-776	1453	2556	298
32	7	1879	637	2486	542
33	7	-2525	742	-849	-12
34	7	-3078	626	-1022	169
35	7	-2474	-620	-2215	-2237
36	7	-2526	-656	-2235	-2204
37	7	-2497	-400	-1851	-1287
38	7	568	2093	3220	2619
39	7	-2919	-868	-3032	-3031
40	7	-2062	-795	-2324	-2274
41	7	-1496	1555	945	945
42	7	-1430	800	698	-1027
43	7	-1550	-455	46	-1477
44	7	-2797	-726	-3046	-3027
45	7	-2438	-588	-2646	-2608
46	7	-2549	-751	-2301	-2302
47	7	-2936	-887	-3028	-3023
48	7	-2833	-939	-2396	-2491
49	7	-3031	-756	-3039	-3052
50	7	-2591	-796	-1179	-2785
51	7	-2311	-912	-2332	-2331
52	7	859	758	1363	1363
53	7	-1701	-676	-1935	-1935
54	7	-2299	-999	-2362	-2370
55	7	-2983	-941	-3036	-3041
56	7	-1524	-632	462	-1264
57	7	-2174	-935	-2824	-2823
58	7	-1539	217	357	-234
59	7	-2775	-1016	-3098	-3098
60	7	-2918	-1192	-2781	-2793
61	7	-2961	-940	-3024	-3113
62	7	-2787	-840	-2796	-2882
63	7	-1795	-971	-2045	-2045
64	7	-3075	-906	-3019	-3088
65	7	-1501	-670	-1574	-1639
66	7	-2796	-1022	-2871	-2870
67	7	3874	5298	3944	5418
68	7	-2820	-1059	-2907	-2906
69	7	4111	2294	4295	4295
70	7	-1827	-1009	-2456	-2465
71	7	-1758	-948	-2009	-2009
72	7	-2886	-1093	-2954	-2953
73	7	-2253	-1007	-1975	-2066
74	7	-1668	-672	-789	-1062
75	7	-1767	-928	-2202	-2421
76	7	-3192	63	-3056	-2137
77	7	2018	1540	2372	1969
78	7	2054	1745	2229	502
79	7	-2645	-684	-3054	-3066
80	7	294	1780	3616	2186
81	7	-2907	-849	-3058	-3057
82	7	1035	2084	2016	2102
83	7	17708	19119	19058	19056
84	7	-1430	-603	-2187	-2137
85	7	-2934	-843	-3027	-3031
86	7	-1297	-198	-680	-1882
87	7	-3013	-1043	-3030	-3030
88	7	-3248	-61	-3250	-3274
89	7	-3236	-1169	-3236	-3226
90	7	-3266	127	-3266	-1498
91	7	-3293	-615	-3082	162
92	7	-3282	-784	-2098	11

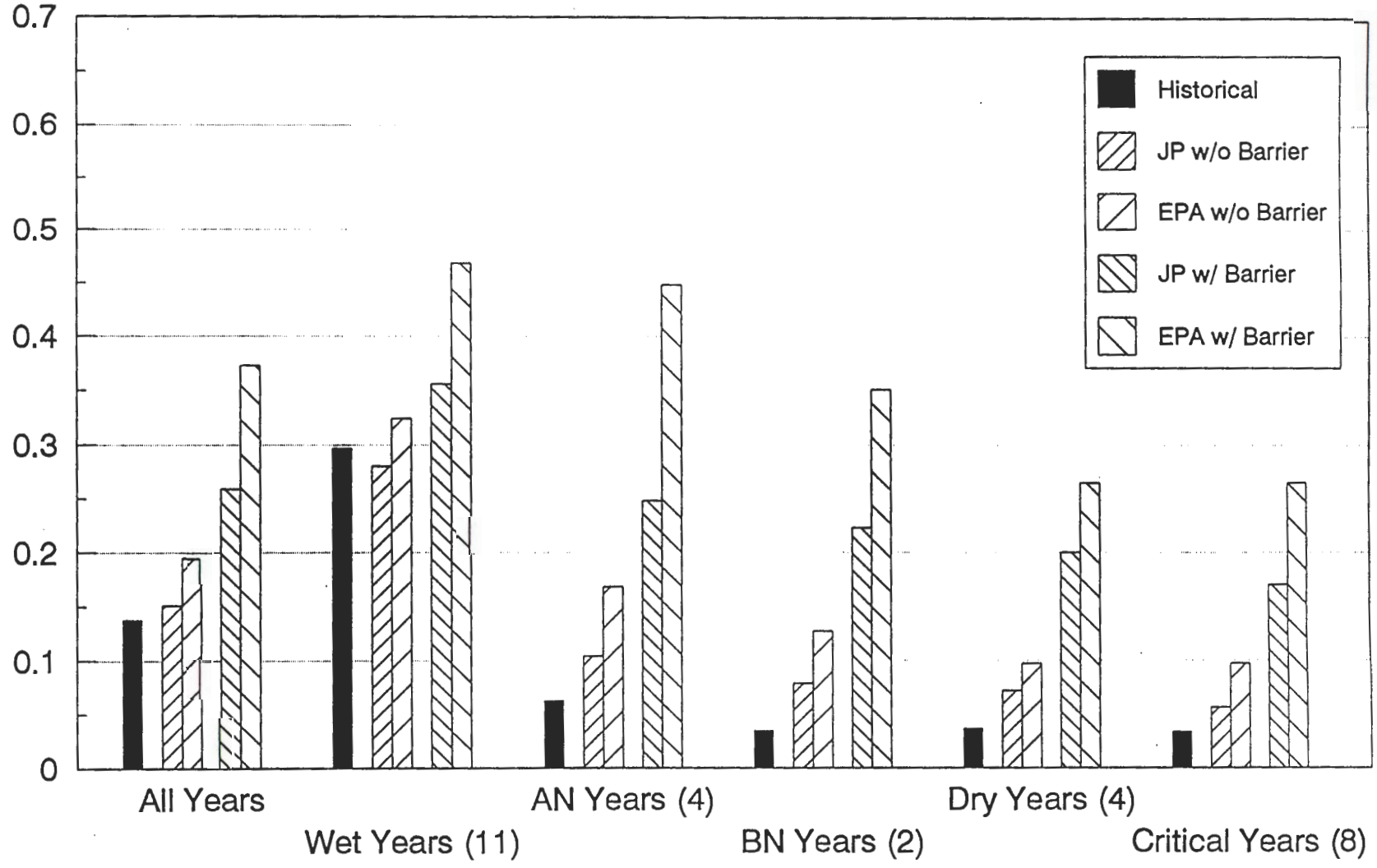
QWEST (cfs)
DWRSIM Output 1922-1992

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	8	-1354	690	-448	-404
23	8	-2566	-3534	-3811	-3570
24	8	-2989	1232	-716	904
25	8	-4357	-3093	-3384	-3071
26	8	-4375	-3806	-3608	-3426
27	8	-3372	-1179	-593	-947
28	8	-3922	-2612	-3710	-3450
29	8	-3622	1452	-498	1083
30	8	645	282	-2363	-3319
31	8	2339	2663	1802	908
32	8	411	1182	726	705
33	8	1248	2429	1485	973
34	8	1652	2370	1596	837
35	8	-3824	-3099	-2386	-3154
36	8	-3538	-3015	-3601	-2061
37	8	-3521	-1038	-196	-141
38	8	267	935	46	397
39	8	-4316	-4265	-4133	-2801
40	8	-3331	-3320	-3547	-3467
41	8	-1870	1137	889	889
42	8	-3070	625	198	242
43	8	-1629	50	-27	19
44	8	-4227	-4169	-4127	-2258
45	8	-3622	-3112	-2483	-2319
46	8	-3924	-3267	-3034	-2343
47	8	-4333	-4299	-4107	-2779
48	8	-4109	-2659	-3871	-3851
49	8	-2822	-1756	-4133	-1383
50	8	-3967	-3832	-2692	-3911
51	8	-3873	-3571	-3564	-3512
52	8	-522	153	-522	-522
53	8	-3770	-1016	-1685	-1670
54	8	-3989	-2483	-3610	-3763
55	8	-4423	-4370	-4166	-2474
56	8	-3275	-1408	-2256	-2356
57	8	-3703	-3545	-4050	-4009
58	8	-1709	-1013	-1052	-903
59	8	-4266	-4230	-4264	-3357
60	8	-4376	-4338	-3933	-2791
61	8	-4397	-1312	-2847	-1669
62	8	-4197	-2048	-3981	-2449
63	8	-3649	-2432	-2436	-3131
64	8	-4360	-4329	-4116	-4218
65	8	-3185	-3117	-2861	-2906
66	8	-4225	-4228	-4004	-4016
67	8	-431	-118	-431	-431
68	8	-4103	-4067	-3724	-3030
69	8	-289	260	-308	-308
70	8	-3480	-2446	-2906	-2532
71	8	-3637	-3414	-3324	-3598
72	8	-4339	-4300	-4120	-4122
73	8	-3830	-2427	-2491	-2488
74	8	-3096	-1341	-2046	-2046
75	8	-3317	-2920	-2506	-3562
76	8	-1958	141	-3107	-1907
77	8	1741	2056	1839	1840
78	8	715	769	232	279
79	8	-4059	-1573	-983	-1280
80	8	83	496	117	163
81	8	-4331	-4280	-4109	-3230
82	8	-1577	-696	-1142	-1145
83	8	1294	1860	1860	1859
84	8	-2937	-1301	-629	-1305
85	8	-4236	-4193	-4100	-4071
86	8	-1536	352	164	393
87	8	-3820	-2255	-4133	-2636
88	8	-3245	1929	-4369	-1190
89	8	-2264	-1574	-1404	-4290
90	8	-535	1895	-80	820
91	8	-1207	1235	887	-1008
92	8	-1067	1205	626	684

Yr	Mth	Club Fed	Water Users	D1485+ 94 ESA	D1485 only
22	9	-809	-700	-886	-809
23	9	-1193	-941	-862	-723
24	9	641	721	-86	522
25	9	-909	-698	-1177	-700
26	9	-1024	-675	-596	-689
27	9	-863	-744	-721	-721
28	9	-1443	-664	-1533	-778
29	9	43	241	-80	96
30	9	-500	-490	-596	-686
31	9	1218	726	1064	622
32	9	-567	-380	-562	-564
33	9	109	724	427	538
34	9	619	685	493	63
35	9	-888	-661	-1194	-671
36	9	-3163	-724	-1041	-702
37	9	-540	-655	-659	-659
38	9	-2127	-444	-1772	-864
39	9	-767	-1146	-1000	-329
40	9	-3647	-1573	-1383	-1071
41	9	-799	-1764	-1130	-1130
42	9	-739	-1061	-1634	-1083
43	9	-710	-731	-710	-710
44	9	-2358	-1337	-1589	-605
45	9	-673	-422	-670	-670
46	9	-2281	-676	-801	-675
47	9	-1400	-932	-2111	-756
48	9	-1235	-1403	-1703	-1982
49	9	-781	-939	-933	-920
50	9	-2422	-922	-1932	-1150
51	9	-2470	-2506	-1391	-1108
52	9	-869	4	-257	97
53	9	-1553	-2156	-1706	-1394
54	9	-2346	-1084	-1065	-1065
55	9	-1073	-1786	-1502	-1030
56	9	-2238	-2608	-3228	-2638
57	9	-2100	-2515	-2326	-1054
58	9	-2617	-1895	-2481	-2239
59	9	-2935	-1494	-3154	-1351
60	9	-1209	-1893	-3342	-981
61	9	-719	-900	-792	-867
62	9	-1002	-1120	-2051	-1111
63	9	-1605	-1244	-1247	-1247
64	9	-1446	-826	-3495	-776
65	9	-1329	-1101	-1721	-910
66	9	-2713	-1872	-3147	-1042
67	9	-1365	-815	-1294	-459
68	9	-1283	-1084	-1028	-1024
69	9	-707	-590	-650	-285
70	9	-1261	-891	-891	-871
71	9	-3104	-2315	-2069	-1495
72	9	-2659	-2095	-3355	-1279
73	9	-1738	-1191	-1197	-1179
74	9	-3768	-3445	-3423	-3423
75	9	-2881	-2384	-3242	-2734
76	9	-441	-44	-421	-419
77	9	1525	610	1046	484
78	9	-1706	-1369	-905	-851
79	9	-1071	-840	-846	-825
80	9	-1292	-1137	-1010	-902
81	9	-890	-679	-619	-616
82	9	1344	2374	1498	1533
83	9	11482	11482	11482	11481
84	9	-1315	-1066	-1338	-1947
85	9	-3537	-2263	-2467	-774
86	9	-1080	-581	-956	-959
87	9	-355	-116	-2262	-630
88	9	-2	724	-1208	-313
89	9	-1421	-973	-1438	-2653
90	9	40	347	-186	-94
91	9	-485	-247	-620	-940
92	9	358	714	266	229

Calculated Smolt Survival Index

1965 - 1993



Smolt Survival Index		Historical	JP Reop w/o Barrier	EPA Reop w/o Barrier	JP Reop w/ Barrier	EPA Reop w/ Barrier
w	1965	0.190	0.168	0.224	0.360	0.224
b	1966	0.020	0.076	0.125	0.220	0.349
w	1967	0.407	0.343	0.399	0.343	0.399
d	1968	0.023	0.071	0.096	0.199	0.264
w	1969	0.410	0.372	0.420	0.372	0.420
a	1970	0.043	0.098	0.163	0.242	0.443
b	1971	0.049	0.081	0.129	0.225	0.353
d	1972	0.011	0.069	0.093	0.197	0.261
a	1973	0.070	0.108	0.172	0.252	0.452
w	1974	0.104	0.111	0.207	0.255	0.543
w	1975	0.076	0.107	0.203	0.251	0.539
c	1976	0.022	0.054	0.096	0.166	0.264
c	1977	0.000	0.053	0.094	0.165	0.262
w	1978	0.446	0.394	0.210	0.394	0.450
a	1979	0.058	0.105	0.169	0.249	0.449
w	1980	0.201	0.191	0.223	0.399	0.559
d	1981	0.057	0.073	0.099	0.201	0.267
w	1982	0.392	0.420	0.484	0.420	0.484
w	1983	0.672	0.614	0.702	0.614	0.702
a	1984	0.080	0.105	0.169	0.249	0.449
d	1985	0.057	0.073	0.099	0.201	0.267
w	1986	0.272	0.257	0.297	0.257	0.297
c	1987	0.060	0.068	0.103	0.188	0.271
c	1988	0.048	0.056	0.099	0.176	0.267
c	1989	0.049	0.056	0.099	0.168	0.267
c	1990	0.031	0.054	0.096	0.166	0.264
c	1991	0.023	0.053	0.096	0.165	0.264
c	1992	0.038	0.054	0.096	0.166	0.264
w	1993	0.094	0.102	0.198	0.246	0.534
Averages						
All Years		0.138	0.151	0.195	0.259	0.373
Wet (11)		0.297	0.280	0.324	0.356	0.468
Above (4)		0.063	0.104	0.168	0.248	0.448
Below (2)		0.035	0.079	0.127	0.223	0.351
Dry (4)		0.037	0.072	0.097	0.200	0.265
Critical (8)		0.034	0.056	0.097	0.170	0.265

DRAFT

Dan Steiner
October 31, 1994
Procedures to compute salmon smolt survival indices

1. April 1 through May 31 Dayflow records were loaded into spreadsheet. Years evaluated were 1965 through 1993. Historical daily records for the San Joaquin River at Vernalis exist under columns noted as "SJR." Historical daily records for exports exist under columns noted as "Exports." ("Exports" within Dayflow are known to differ from the sum of Tracy Pumping Plant and Clifton Court Forebay inflows. For this analysis it is assumed that the difference is inconsequential to the results.)

2. The years are classified according to the 60-20-20 San Joaquin River Index.

3. Ag/CUWA proposal "reoperation" is performed to the historical record. For San Joaquin River flows, the reoperation provides Vernalis with the greater of a) the historical flow, or b) the minimum flow of the Ag/CUWA proposal. Reoperation exports for the April 15 - May 15 period are consistent with the Ag/CUWA proposal, and do not exceed the flow at Vernalis. During wet years when Vernalis flows exceed 5,000 cfs, exports are assumed limited to 6,000 cfs which is the approximate amount of pumping that results within DWRSIM studies due to other pumping limitations or system operations. Pumping during the remainder of the April - May period is limited to 6,000 cfs or less, and recognizes the results of DWRSIM modeling.

4. The EPA proposal "reoperation" is similarly performed. The San Joaquin River at Vernalis is maintained during April 15 - May 15 in accordance with the EPA proposal. During the remainder of the April - May period, Vernalis is equal to the historical flow, or 1,000 cfs, whichever is greater. Exports are constrained throughout the April - May period in accordance with the EPA proposal.

5. "Flow conditions" for various segments of the April - May period are summarized. San Joaquin River flow and exports were evaluated for three periods: a) April 1 -14, b) April 15 - May 15, and c) May 16 - 31. These values appear below the actual flow data for each year.

6. The FWS salmon smolt survival index model was used to determine a survival index for each of the three time periods, for the historical and reoperation scenarios, with and without the Old River Barrier during the April 15 - May 15 period. The Old River Barrier is assumed to not be in place when flow at Vernalis exceeds 10,000 cfs. Temperature is assumed to be 65 degrees. Delta consumptive use is assumed to be an average 821 cfs during April 1-15, 1,471 cfs during April 15 - May 15, and 2,225 cfs during May 16-31.

7. A weighted "annual" survival index was developed by assuming 80 percent of smolt would migrate during the April 15 - May 15 period, with the remaining 20 percent of the smolt migrating uniformly during the remainder of the April - May period.

Attachment 3 to the Report on
Joint Water Users Proposal
November 10, 1994

BAY-DELTA STANDARDS DISCUSSION

Synopsis of the October 18, 1994 Meeting

Introduction

The purpose of the October 18, 1994 meeting (agenda and attendance list attached) was to develop a list of areas in which there are technical disagreements concerning the Ag/Urban Joint Water Users proposal for comprehensive Bay-Delta standards. The proposal was reviewed in the meeting and areas of technical disagreement were noted, along with some general and specific remarks concerning the disagreements. In most instances, assignments were made to provide information that would either clarify the technical basis for the disagreement or narrow down (and perhaps resolve) the disagreement.

This document summarizes the most significant areas of disagreement raised by Federal agencies. While the proposals being considered cover a wide range of topics and measures, the technical disagreements were narrowed down to the list below. The summary includes the general area of technical disagreement, a summary of the specifics and the relevant assignment listed as an Action Item. The attached Appendix includes details on the topics summarized below that were made by all parties present.

In addition to the Action Items below, the Ag/Urban group committed to provide Club FED with its technical documentation as soon as possible.

Category I - X2 Standard

Summary The differences in the Ag/Urban proposal and the Club FED proposal are the 1971.5 (Ag/Urban) versus 1968 (Club FED) level used in the sliding scales and the confluence standard/minimum flows in February and April-June period (Ag/Urban) versus the 150 days at the confluence (Club FED).

The discussion focused on the triggering mechanism, not defined at the time of the meeting, for the February confluence standard in the Ag/Urban proposal, the requirements for flows in very dry years, and whether the two proposals were in fact significantly different.

It was suggested that the differences are not very significant and the two proposals are probably not very different in biological protection, but that more information was needed to confirm this.

Action Items:

1. Ag/Urban group to define trigger mechanism for February confluence portion.

2. Ag/Urban group to generate, from operations studies, the difference in X2 locations for the two proposals and provide the data to Bruce Herbold (EPA).

3. Bruce Herbold to review the data and provide a technical analysis, and the technical basis for the 1968 level for the sliding scale.

4. Ag/Urban group to assess the effects of the two proposals on upstream reservoirs in very dry years and provide the data to John Burke (USBR).

5. John Burke to review the data and provide a technical analysis.

Category II - San Joaquin River Spring Measures

Summary

The major disagreement, characterized as significant, was identified as the level of protection for San Joaquin fall run smolts in the Ag/Urban proposal. It was pointed out that the level of flows proposed during the one month period are significantly less than those in the Club FED alternative, and that the export limits in the Ag/Urban proposal (although agreed to as a significant improvement over historical conditions) are significantly higher than the Club FED alternative. It was further pointed out that the combination of lower flows and higher exports would likely produce lower benefits than the Club FED alternative.

The Ag/Urban proposal provides for the use of the Old River barrier, which will increase significantly the protection of San Joaquin fall run smolts at any given flow and export level. However, it was suggested that its use may have negative impacts on Delta smelt and winter run salmon, and for this reason the Club FED proposal currently includes a 1500 cfs export limit, in order to minimize any negative impacts. It was also pointed out that fish agencies want the barrier tested at a wider range of conditions before they accept it as a permanent project or standard.

A second major difference is that the Club FED proposal includes smolt survival goals which are intended to be consistent with the CVPIA fish doubling requirements, whereas the Ag/Urban proposal does not establish a numerical goal. The Ag/Urban group does not consider these CVPIA goals as part of the Bay-Delta standards, although its proposal is not inconsistent with them.

The concern was expressed that the San Joaquin salmon populations are at critically low levels and if protection through the Bay-Delta process is not significant, ESA listing may become imminent. It was pointed out that conditions in the Delta are believed to be critical to the maintenance and restoration of the run (based upon analyses that show significant correlations of adult escapement with export and flow conditions during their smolt outmigration 2 1/2 years earlier) and that a low level of Delta protection will not ensure that this run is not listed in the near future.

Action Items:

6. DWR to provide Mike Thabault with relevant modeling results.

7. Mike Thabault to review modeling results, identify data related to flow and entrainment with and without barriers, and provide the data to Ag/Urban group for review.

8. Ag/Urban group to provide a comparison of the benefits of its proposal for comparison with the Club FED alternative.

Category II - Export limits

Two areas of possible disagreement were identified, but were characterized more as questions than disagreements at this point. The first is that the Ag/Urban proposed export limits are higher than the average of historical limits, and therefore may not provide significant changes from historical levels and could allow greater impacts in a significant part of the year. The Ag/Urban group pointed out that the proposal shifts exports from the period of greatest potential impacts (March through July) to that of lesser potential impacts; the 65% limits are proposed to ensure that levels are reasonably capped in any period. They also pointed out that it is not technically appropriate to compare maximum limits with average levels, since the average levels are driven by wet year statistics.

The second concern was that the Ag/Urban proposed 65% export limit for January and February would allow export and Qwest levels that are too high in magnitude and frequency; it was suggested that, depending on the magnitude and frequency, this would cause additional degradation for species using the Delta during this time (late fall, spring and winter run salmon). The Club FED proposal uses absolute export limits in April and May, and export limits based on Qwest in November through April. The discussion also brought up the question of whether the proposal improves levels of Qwest in frequency and magnitude compared to historical levels.

In the discussion, it was suggested that high pumping levels at the end of a drought were of concern (1978 as the example), rather than those at the beginning of a drought. It was also pointed out that salvage has been high when Qwest is positive, indicating that export limits are likely the significant parameter.

Action Items:

9. The Ag/Urban group will provide the month-to-month variation in historical exports and export-inflow ratios, and what they would be with the proposed limits. Both historical data and operations studies will be used.

10. Shiela Greene (DWR) will provide salmon smolt salvage data for 1994, 1993, 1992, and 1986, and Qwest data from Dayflow for the same period (to allow an examination of the basis for using Qwest to limit exports).

11. The Ag/Urban group will provide frequency/magnitude data for Qwest and exports for the proposal, including the January-February period.

12. The Ag/Urban group will provide frequency/magnitude data for Qwest and exports for a comparison with the Club FED proposal.

13. Pat Brandes to provide data used in the smolt survival - Qwest analysis.

Category II - Cross Channel Closures

The only significant disagreement identified was the closure in June in the Club FED proposal. Alternative June closure schemes (weekdays only) were suggested.

The Ag/Urban group is considering a November-January 30 day closure based upon monitoring parameters (including flows and turbidity).

Action Item:

14. Pat Brandes to provide data supporting June closures.

Category III - Legal Fishing

The inclusion of legal fishing limits as part of SWRCB requirements was objected to by the Department of Fish and Game. This was raised as a policy issue, and possibly a technical issue. It was stated that this is regulated independently and takes into account the status of the species. The Ag/Urban group responded that most Category III measures are proposed for evaluation, and to be implemented if found to appropriate and effective in the evaluation.

Action Item:

15. Ag/Urban group to provide Don Stevens and Terry Mills (DFG) the discussion section from the documentation on this item for their review.

16. Don Stevens and Terry Mills (DFG) to review and respond to the material.

Other Issues

(1) Measures for spring-run salmon and for rearing of salmon in the Delta in the late fall.

A lack of specific measures for spring-run salmon and for the rearing of salmon in the Delta in the late fall was noted by USFWS. This will be addressed in the Ag/Urban documentation.

(2) Striped Bass

The Department of Fish and Game disagreed with the absence of specific measures to protect and enhance the striped bass population.

(3) Warm Water Spawning Standards

The absence of specific measures on the San Joaquin River for warm water fish spawning were noted.

Action Item:

17. The Ag/Urban group will provide in its documentation the reasons for not including this.

(4) Monitoring

The use of fish monitoring to determine operational levels was questioned on the basis of feasibility (for low-population species) and because it may result in technical disputes if not properly devised; others want to test it. There was agreement that these are technical issues that need to be addressed to ensure an adequate program is implemented.

(5) Acoustical Barrier

It was suggested that the acoustical barrier be consistently adopted - if it works, use it all the time; if it cannot be shown to work, why include it? The data on the barrier are still under development and the barrier is still considered experimental.

(6) Trigger Levels for the Export Limits

It was strongly urged that the language not use "take" as this has a specific legal meaning. It was agreed that this would be clarified.

(7) Suisun Marsh Preservation Agreement

Concern was expressed by environmental groups about the deficiency standards in the Agreement and whether they consider them sufficiently protective.

Appendices:

1. Details on Discussion topics
2. Meeting Agenda
3. Attendance List

APPENDIX TO BAY-DELTA STANDARDS DISCUSSION
SYNOPSIS OF OCTOBER 18, 1994 MEETING
DETAILS ON DISCUSSION TOPICS

This document contains notes of discussions not included in the synopsis of the October 18 Meeting.

X2 - Standard Discussion

Ag/Urban February Proposal - There was concern that moving away from the sliding scale will result in a burden on upstream reservoirs in very dry years. The manner in which the dry/critical year portion is triggered raised concerns, and needs to be defined.

There were concerns that the April - June provisions would not guarantee that the X2 position would actually reach the confluence. It was pointed out that other standards (water quality for agriculture and M&I) would ensure the position would not move too far away and this would be apparent in the operations studies. The need for the X2 position to actually locate at the confluence was questioned, and it was pointed out that its actual position varied greatly over a day and a spring-neap cycle. It was also pointed out that the whole scientific basis of the standard was to provide general habitat improvement, not a rigid requirement at a location.

There was interest in the position of X2 in the years like 1977 when no days are required in March, and the frequency of such events. This is to be addressed in Action Item 7.

San Joaquin River Spring Measures

It was suggested that the flow levels for the pulse flows were only slightly better than historical levels and are unlikely to provide much benefit. Smolt survival based on the USFWS model was found to be less than other proposals. It was suggested that pulse flow and survival data above the Delta as well as within it should be reviewed, since survival is the product of the two rates.

A statement of the proposal's goals was requested, as was the basis for the 1000 cfs base flow. The efficiency of the base flow was questioned since it is lower than the recent springtime historical levels, although it does fall below that level in other periods.

The export levels were questioned as too high to be protective of Delta Smelt and San Joaquin salmon, although it was noted that the levels are a significant improvement over the historical levels in most dry years.

The Club FED proposal was clarified as being "consistent with" the doubling goal of the CVPIA, but not in and of itself providing the doubling.

There was a discussion on the basis for the 1500 cfs export limit in the Club FED proposal. This was apparently based on modeling and the data will be provided (Action Item 7). Flow levels were developed in part from the USFWS model and DFG analyses (Exhibits 15 and 25), in part by examining historical levels and in part from discussions with Pat Brandes and Marty Kjelson.

Export Limits

- It was pointed out that the proposed fall and early winter limits were exceeded only very occasionally in the historical record, and that the proposed limits are greater than historical averages. It was also pointed out that the average over the historical period is biased by wet events and the measures are designed primarily to provide additional protection in the spring and early summer in drier periods and to ensure a cap in other periods. Action Item 8 will address this.

  Concern was expressed about high exports at the end of a drought, as in 1978. This was considered more significant than high exports at the end of a wet period prior to a drought.

  It was suggested that relationships other than the export/inflow ratio be explored, such as non-linear relationship or flat limits, the latter based on information suggesting that transport in the Delta, at low inflows, is largely driven by tidal dispersion rather than net advection.

  The range of possible QWEST levels at a 65% export/inflow ratio was indicated to be from +9000 cfs to -6000 cfs. The frequency and magnitude of QWEST for the proposal was discussed. This will be addressed in Action Items 11 and 12.

  The basis for using QWEST as an export limit was questioned. Data on this will be provided under Action Items 9, 10 and 13.

Cross-Channel Closures

The discussion centered around the November - January closures, which are being considered by the Ag/Urban group, and the June closure. Technical justification for the June closure will be provided in Action Item 14.

Legal Fishing

Inclusion of this in the Category III list was objected to as not in the domain of the SWRCB (policy issue) and possibly as a technical issue in that it is already addressed by

regulatory agencies. It was pointed out that "zero salmon limits" are imposed on the San Joaquin River upstream of Mossdale, and the Tuolumne, Merced and Stanislaus Rivers also are severely restricted (closed or "zero" limit). Clarification will be provided in Action Item 15.

Category III in General

It was suggested that it would be more appropriate to describe the measures as those which need to be evaluated, and managed if the appropriate measures are determined in the evaluation. It was noted that most of these measures are in fact proposed for evaluation and to be implemented if found to be appropriate and effective in the evaluation.

GG/ce

F:\CE\SHARED\AGUB1018.NTS 11/02/94 9:30

Bay-Delta Standards Discussion
2800 Cottage Way, Room 1107
9:00 a.m., October 18, 1994

Objectives:

- ***Explain Water User Package***
- ***Document Areas Of Agreement And Apparent Disagreement***
- ***Identify Process For Getting Data Explaining Disagreement***

Agenda

1. Opening Remarks
   a. Introductions
   b. Review objectives of meeting

2. Water User Situation
   a. Agreement highly desirable
   b. Meeting is for information exchange, not negotiation

3. Water User Package
   a. Description
   b. Brief explanation

4. Discussions
   a. Reaction to water user package
      - areas of agreement
      - areas of disagreement
   b. Discussion of means of obtaining data explaining disagreements

5. Summary of Meeting

MP-748(6/72)

Meeting Attendance Record
U. S. Bureau of Reclamation, Mid-Pacific Region

Appendix 3

1/3

Date: Tuesday, Oct. 18, 1994 Time: 9:00 – Place: Federal Bldg W-1107

Subject of Meeting: Bay/Delta Standards Technical Meeting

NAME	ORGANIZATION	ADDRESS
Greg Gartrell	CCWD / Joint with User Group	(Street) P.O. Box H20 510 671 5122 FAX (City/State) Concord CA 511 674 8057
Joe Miyamoto	EBMUD	(Street) 500 San Pablo Dam Rd. 510-254-37 (City/State) Orinda, CA 94563
Dudley Reiser	R2 Resource Consultants CWWD Consultant	(Street) 15250 NE 95th St (City/State) Redmond, Wash 98052
B.J. Miller	SLAMWA	(Street) PO Box 5995 510 644 1811 (City/State) Berkeley CA 94705 8278 fa
Susan Hatfield	USEPA	(Street) 75 Hawthorne St. (City/State) San Francisco CA 94105
Patrick [illegible]	EPA	(Street) " " (City/State) " "
Dave Schuster	KCWA	(Street) (City/State)
David Fullerton	NHI	(Street) 114 Sansome St., Suite 1200 (City/State) San Francisco 94
Katie Perry	DFG, Inland Fisheries	(Street) 1416 Ninth St. (City/State) Sacramento, CA 95814
TERRY MILLS	DFG, Inland Fisheries Division	(Street) 1416 Ninth St (City/State) SACRAMENTO 95814
Gary Bobker	Bay Institute	(Street) 625 Grand Ave #250 415/ (City/State) Sausalito, Ca 94901 721-768
DON STEVENS	CFG	(Street) 4001 N WILSON WAY (209) (City/State) STOCKTON CA 95205 948-7800
Bruce Herbold	EPA	(Street) (City/State)
Pat Brandes	USFWS	(Street) 4001 N. Wilson Way (City/State) Stockton, CA 95205 946-6400

☆ GPO 792-193

MP-748(6/72)

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Meeting Attendance Record
U. S. Bureau of Reclamation, Mid-Pacific Region

Date: Tuesday, Oct 18, 1994 Time: 9.00 — Place:

Subject of Meeting: Bay/Delta Stds Technical Mtg

NAME	ORGANIZATION	ADDRESS
Richard Denton	CCWD	(Street) 1331 Concord Ave, P.O. Box H20 (City/State) Concord CA 94524
Andrew Hitchings	DeCuir & Somach	(Street) 1755 Creekside Oaks, Ste 290 (City/State) Sacto. CA 95833 (916) 927-9575
CLIFF SCHULZ	KERN COUNTY WATER AGENCIES	(Street) 400 CAPITOL MALL, 27th FLOOR (City/State) SACRAMENTO CA 95814
PAUL BRATOVICH	BEAK Consultants Inc. (Consultants to KCWA)	(Street) 4600 Northgate Blvd, #215 (City/State) SACRAMENTO, CA 95834 (916) 565-7900
Herbert W Greydanus	Bookman-Edmonston Engr (consultant to NCWA)	(Street) 3100 Zinfandel (City/State) Sacramento 95670 916 852 5050
Randy Brown	DWR	(Street) 3251 S 916 227-7531 (City/State) Sacramento 95816
Sheila Greene	DWR	(Street) 3251 S Street Room B-13 (City/State) Sacramento CA 95816
Randy Bailey	Consultant/MWD	(Street) 3050 Meadow CK. Rd. (City/State) Lincoln, Ca. 95648
Steve Arakawa	MWD	(Street) P O Box 54153 (City/State) Los Angeles, CA 90054
TOM BERLINER	SAN Francisco P.U.C.	(Street) 400 Van Ness Avenue, RM 206 (City/State) San Francisco, CA 94102
ED WINKLER	DWR	(Street) 1416 NINTH ST. (City/State) SACTO CA 95841
Curtis Creel	DWR	(Street) 1416 9th St (City/State) Sacto CA 95841
JOHN BURKE	USBR	(Street) 2800 COTTAGE WAY (City/State) SACTO CA 95825
WIM KIMMERER	Romberg Tiburon Ctr./BAY INST.	(Street) 3150 PARADISE DR. (City/State) TIBURON CA 94920
GARY STERN	NMFS	777 SONOMA AVE #325 SANTA ROSA, CA 95404

☆ GPO 792-103

Attachment 2 to the Report
on the Joint Water Users Proposal
November 10, 1994

TABLE 1

	DAYFLOW	OP STUDY	OP STUDY & AG/CUWA (FLOW & EXPORT)	OP STUDY & AG/CUWA (Flow/Export/ Barrier)	OP STUDY & EPA
W	.34	.22	.21	.26	.38
AN	.08	.07	.11	.14	.20
BN	.04	.05	.08	.11	.16
D	.04	.04	.06	.10	.13
C	.04	.03	.07	.10	.13
$\bar{x}$	.17	.12	.13	.17	.24

1.) 64% of fish going through Delta between April 15-May 15, 18% of fish from April 1-April 14, 18% of fish from May 16-May 31.

2.) All studies (dayflow, op study, AG/CUWA flow & exports, AG/CUWA flow, exports and barrier, and EPA) used 1965-1989 hydrology.

3.) Operational study used DWRSIM with 1995 level of development and 6.0 million acre feet demand.

table.wpf

TABLE 2

% EXPORTED BY MONTH

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1955										13	3	0
1956	0	0	1	1	1	3	19	21	10	4	0	0
1957	0	4	3	3	6	14	33	29	14	5	2	0
1958	0	0	0	0	1	1	15	19	9	7	3	1
1959	1	1	6	6	21	40	35	27	15	14	7	2
1960	1	1	6	6	15	32	37	34	18	17	4	0
1961	2	2	7	7	20	34	42	32	20	18	7	1
1962	3	0	2	2	12	21	36	28	15	3	4	0
1963	2	1	6	6	5	13	29	29	11	12	2	0
1964	2	7	13	13	20	30	37	32	16	19	4	0
1965	0	3	7	7	8	15	29	24	11	9	2	0
1966	0	2	9	9	21	38	36	32	18	17	5	1
1967	1	1	3	3	2	3	8	23	12	8	6	3
1968	4	3	10	10	37	37	37	34	40	46	32	14
1969	5	3	3	3	5	5	16	23	10	9	5	2
1970	1	2	4	4	22	32	34	27	14	14	8	2
1971	3	8	13	13	14	18	28	28	14	19	17	9
1972	6	14	25	25	45	35	31	41	37	35	13	11
1973	3	1	2	2	31	39	45	43	29	29	8	4
1974	1	8	7	7	20	30	44	36	17	18	7	9
1975	23	11	8	8	15	14	24	41	32	30	29	26
1976	44	51	49	49	44	33	30	46	58	48	45	30
1977	63	47	52	52	36	8	8	18	25	13	35	46
1978	14	16	7	7	6	37	48	45	34	30	33	37
1979	13	6	10	10	28	40	50	58	54	47	32	24
1980	5	5	4	4	16	24	31	52	37	41	43	34
1981	35	25	16	16	27	31	41	56	47	51	12	5
1982	5	9	12	12	9	10	15	31	16	18	14	9
1983	10	6	2	2	3	6	9	20	11	7	2	1
1984	2	12	16	16	29	33	38	43	25	30	25	21
1985	27	33	47	47	37	41	49	61	60	63	57	51
1986	38	3	2	2	26	31	41	52	45	37	41	41
1987	38	33	21	21	40	40	51	58	66	52	54	52
1988	36	72	59	59	47	45	48	57	60	52	47	51
1989	71	60	21	21	37	33	46	56	59	66	62	61
1990	52	67	69	69	26	28	41	43	51	38	41	43
1991	48	49	33	33	29	18	23	36	38	50	36	29
1992	54	20	45	45	20	19	15	26	41			
59-91 MEAN	17	17	17	17	23	27	34	38	31	29	22	19
59-76 MEAN	6	7	10	10	20	26	32	32	22	20	11	6
77-91 MEAN	30	30	25	25	26	28	36	46	42	40	36	34

TABLE 3: Average Export/Inflow Ratios by Water Year Type between 1967 and 1992.

	YT	CODE	N	MEAN	MEDIAN	TRMEAN	STDEV	SEMEAN
JAN	C	1	5	48.60	48.00	48.60	9.99	4.47
	D	2	4	42.75	36.50	42.75	19.40	9.70
	B	3	3	7.67	6.00	7.67	4.73	2.73
	A	4	3	7.33	5.00	7.33	5.86	3.38
	W	5	10	8.90	4.00	6.25	12.23	3.87
FEB		1	5	57.20	51.00	57.20	11.45	5.12
		2	4	37.75	33.00	37.75	15.31	7.65
		3	3	7.67	6.00	7.67	5.69	3.28
		4	3	7.33	5.00	7.33	7.77	4.48
		5	10	6.30	7.00	6.25	3.89	1.23
MAR		1	5	52.40	52.00	52.40	13.30	5.95
		2	4	26.25	21.00	26.25	14.03	7.02
		3	3	15.00	10.00	15.00	8.66	5.00
		4	3	4.33	4.00	4.33	2.52	1.45
		5	10	7.00	5.50	6.50	5.10	1.61
APR		1	5	52.40	52.00	52.40	13.30	5.95
		2	4	26.25	21.00	26.25	14.03	7.02
		3	3	15.00	10.00	15.00	8.66	5.00
		4	3	4.33	4.00	4.33	2.52	1.45
		5	10	7.00	5.50	6.50	5.10	1.61
MAY		1	5	36.40	36.00	36.40	9.13	4.08
		2	4	35.25	37.00	35.25	5.68	2.84
		3	3	36.67	37.00	36.67	8.50	4.91
		4	3	17.67	16.00	17.67	12.58	7.26
		5	10	14.50	14.50	14.25	9.65	3.05
JUN		1	5	26.40	28.00	26.40	14.15	6.33
		2	4	36.25	36.50	36.25	4.99	2.50
		3	3	37.33	37.00	37.33	2.52	1.45
		4	3	33.33	37.00	33.33	8.14	4.70
		5	10	18.20	16.00	18.25	12.25	3.88
JUL		1	5	30.00	30.00	30.00	15.64	6.99
		2	4	46.75	47.50	46.75	4.35	2.17
		3	3	39.33	37.00	39.33	9.71	5.61
		4	3	41.33	45.00	41.33	9.07	5.24
		5	10	25.70	26.00	25.62	13.33	4.21
AUG		1	5	40.00	43.00	40.00	14.44	6.46
		2	4	57.75	57.00	57.75	2.36	1.18
		3	3	44.33	41.00	44.33	12.34	7.13
		4	3	46.67	45.00	46.67	4.73	2.73
		5	10	32.40	29.50	31.50	10.35	3.27
SEP		1	5	46.40	51.00	46.40	14.74	6.59
		2	4	58.00	59.50	58.00	7.96	3.98
		3	3	43.67	40.00	43.67	9.07	5.24
		4	3	33.33	34.00	33.33	4.04	2.33

TABLE 3 (Cont.)

	5	10	19.60	15.00	17.63	11.23	3.55
OCT	1	5	40.20	48.00	40.20	16.13	7.21
	2	4	58.00	57.50	58.00	7.62	3.81
	3	3	42.67	46.00	42.67	6.66	3.84
	4	3	33.33	30.00	33.33	6.66	3.84
	5	10	19.00	18.00	18.25	10.32	3.26
NOV	1	5	40.80	41.00	40.80	5.31	2.37
	2	4	46.2	55.5	46.2	23.1	11.5
	3	3	25.67	32.00	25.67	10.97	6.33
	4	3	28.0	33.0	28.0	18.0	10.4
	5	10	15.40	11.00	13.88	12.64	4.00
DEC	1	5	39.80	43.00	39.80	9.83	4.40
	2	4	42.2	51.5	42.2	25.2	12.6
	3	3	16.33	14.00	16.33	6.81	3.93
	4	3	25.0	34.0	25.0	18.2	10.5
	5	10	12.30	9.00	10.12	13.11	4.14

Table 4. Distribution (percent) of total midwater trawl catch chinook smolts by month at Chipps Island from 1978 to 1991.

Year	April	May	June
1978	27	40	33
1979	19	52	29
1980	14	34	52
1981	34	50	16
1982	18	49	33
1983	19	49	32
1984	11	66	23
1985	26	63	11
1986	37	55	8
1987	44	54	2
1988	27	70	3
1989	29	62	9
1990	31	56	12
1991	14	72	12
$\bar{x}$ (1978-1991)	26	54	20

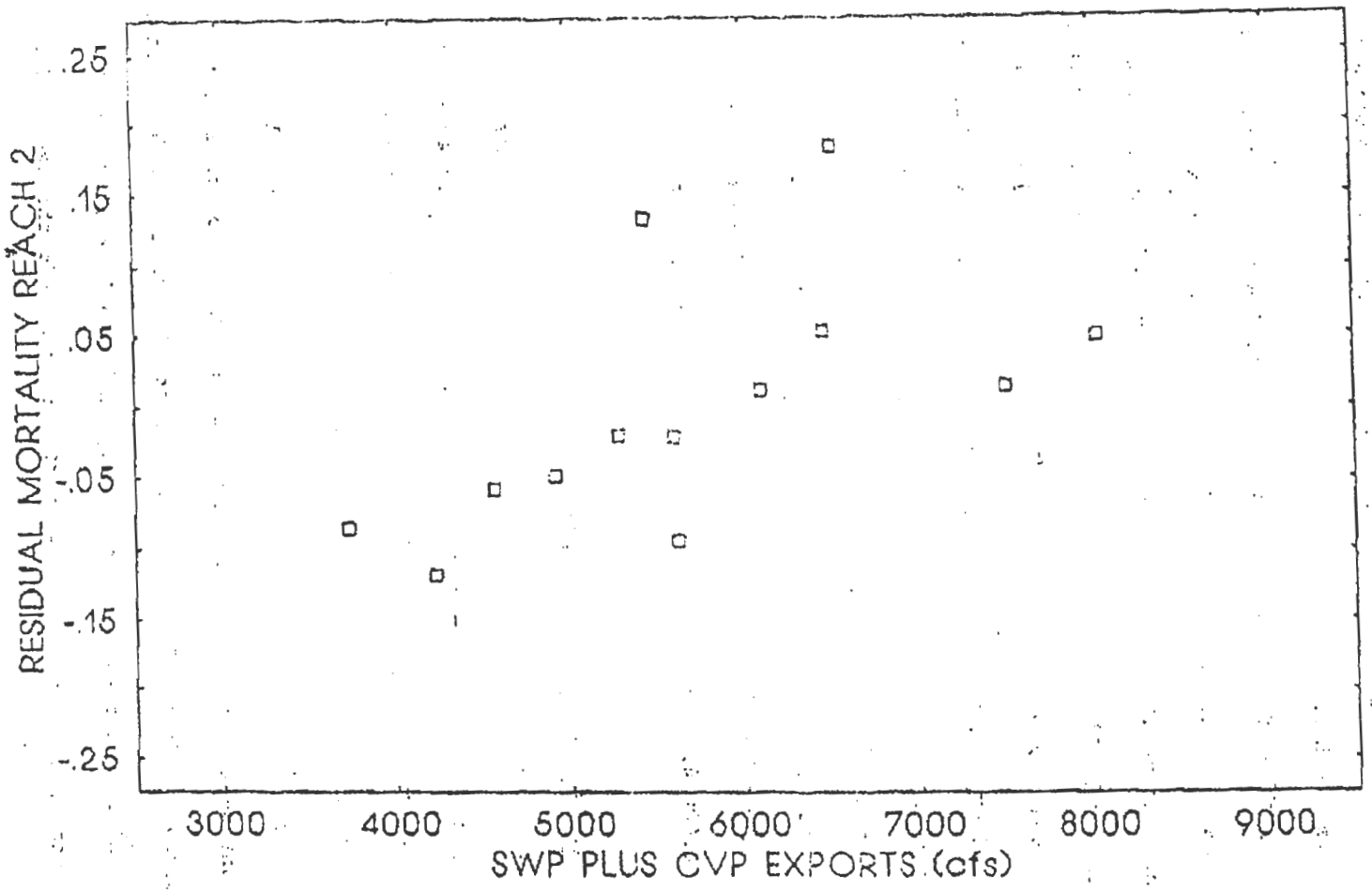

Figure 1

FIGURE 1, RESIDUAL CHINOOK SALMON SMOLT MORTALITY VERSUS AVERAGE DAILY WATER TEMPERATURE AT FREEPORT ON RELEASE DAY, REACH 2

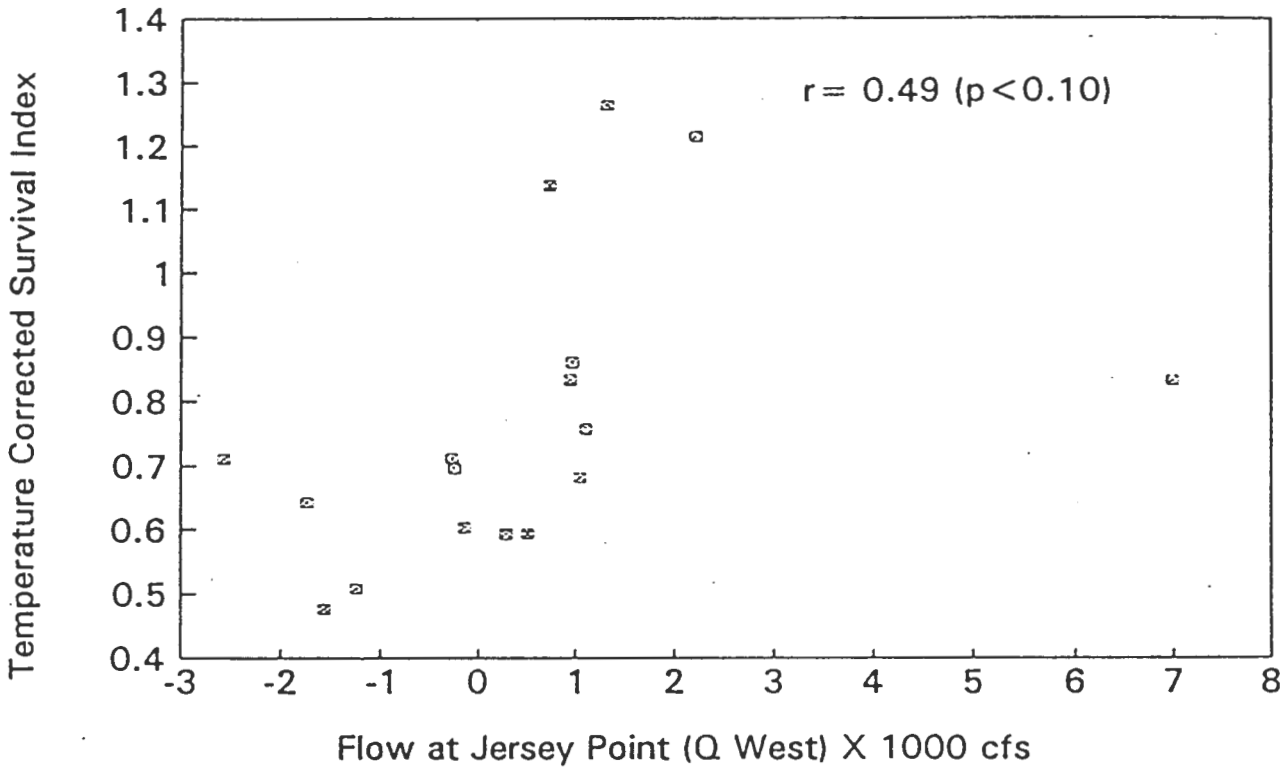

Figure 12: Temperature corrected survival for fish released at Ryde between 1984 and 1992 versus flow at Jersey Point on the San Joaquin River .

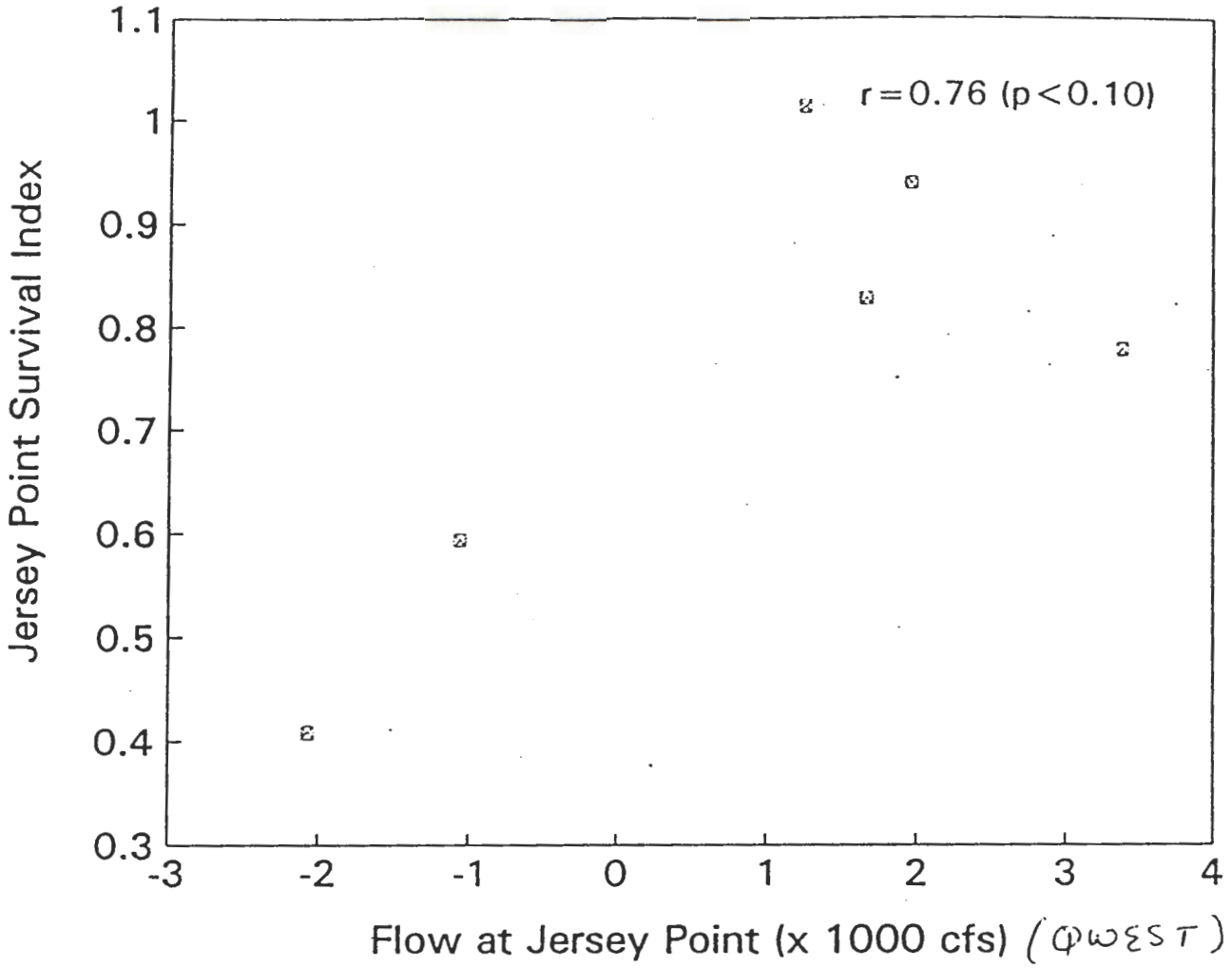

Figure 3: Temperature corrected (to 61 degrees F.) survival indices for CWT salmon smolts released at Jersey Point and recovered at Chipps Island between 1989 and 1991. Flow estimates were the 5 day mean starting on the release date.